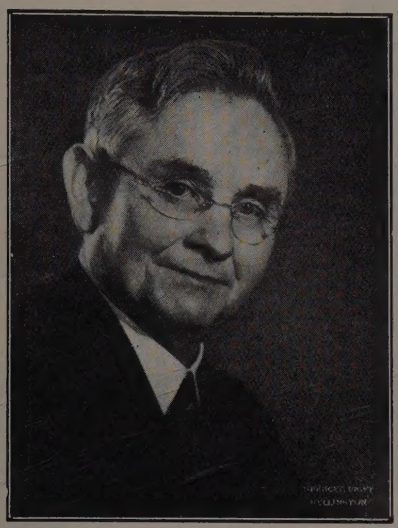
Congratulatory messages:—



THERE may be many reasons for the decision to enlarge the scope of the *Journal of Agriculture*, but it seems to me by far the best reason for extending instructional science is the increasing importance of New Zealand's primary industries.

Our exports for the year ended 30th September last reached the record level of £66,000,000, representing an increase of 52 per cent. in two years. Most of that splendid result is attributable to farming in the widest sense of the term. Has production reached its maximum limit? The answer is so obvious that it is hardly necessary to state it. There is ample scope for a greater development on the right lines.

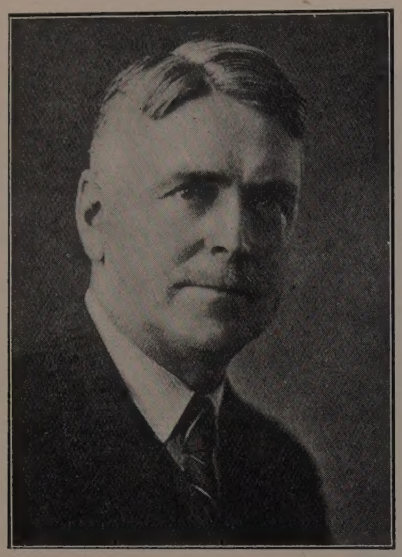
It can be fairly claimed, I think, that the Department of Agriculture has played no small part over many years in the development of field industries. Also, it is fair to say that the *Journal of Agriculture*, even in its restricted form, has rendered valuable service as a medium for recording the experiments and accomplishments of the Department's expert officers.

I am not a farmer, but one does not need to be an agricultural expert to understand that even the best tiller of the soil, pastoralist, or orchardist, like everybody else in life, has always something more to learn in a changing world. So it is reasonable to believe that a *Journal* on up-to-date lines as regards the explanation and illustration of scientific knowledge could not fail to be of benefit to efficient farmers, and a boon to the man with a lot to learn and not afraid to accept instruction.

I congratulate the Minister of Agriculture, the Hon. W. Lee Martin, and his departmental officers on their enterprise, and I trust that the *Journal of Agriculture* in its new form will command success as an aid to the man on the land.

M. J. Savage

Prime Minister of New Zealand.



The Hon. W. Nash,

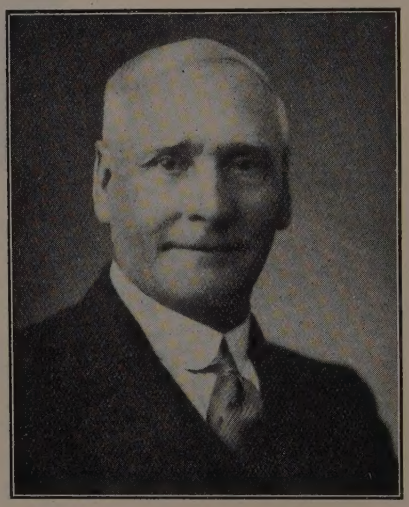
Minister of Marketing.

THERE was once a time when the farmer provided most of the needs of his family and personally sold the surplus product of his land. But this time has long since gone. A great number of the needs of the farmer are now supplied by others, while he specializes in the growing of products for which his farm is most fitted, be it fat lambs or wool, wheat, or butterfat.

Just as the farmer has become a specialist in his job of farming, so there has grown up another group of specialists—those who devote their time to marketing produce to the best advantage. In New Zealand the specialist may be the fat-lamb buyer, or the stock firm which sells the wool; in dairying a further organization grew up between the farmer and the market—that is, the dairy factory, which in most cases was co-operatively owned and controlled. It became the job of the directors to entrust the selling of butter and cheese to merchants whose head offices are in Tooley Street, London. The factory sold either directly to the Tooley Street representatives in New Zealand or consigned produce to these same firms in London.

This system had many defects—there was the conflict between f.o.b. and consignment business, there were the losses of speculation, there was the difficulty of unorganized marketing both in London and at the outports, there was no united control or supervision. This system has gone. The defects have been removed. Centralized marketing of dairy-produce means that not only is speculation cut out from among the agents handling our produce, but the agents' commission has been reduced and the maximum returns are coming in from sales. New Zealand specialists in marketing are handling New Zealand's dairy-produce. With fruit and with meat New Zealand's representatives, within the limits of their legislation, are doing excellent work, too, but they have not the powers to supervise the marketing of their particular produce to the extent given to the Dairy Sales Division of the Marketing Department.

The farmer is becoming more and more freed to concentrate on his own particular problem—that of bringing more high-quality products from the land and at the same time improving the quality of that land. That is the farmers' problem, and that is the reason for the existence of the Department of Agriculture and for the new features in this *Journal*. I know they will meet with the approval of all farmers.



The Hon. W. Lee Martin,

Minister of Agriculture.

THE issue of the *Journal of Agriculture* in a new and enlarged form marks another development in the advisory and instructional services provided for the farmer by the Department of Agriculture. The trend of the Department's activities towards instructional work rather than inspectorial has been most marked in recent years, and it is felt that the *Journal* should be brought into line with that movement.

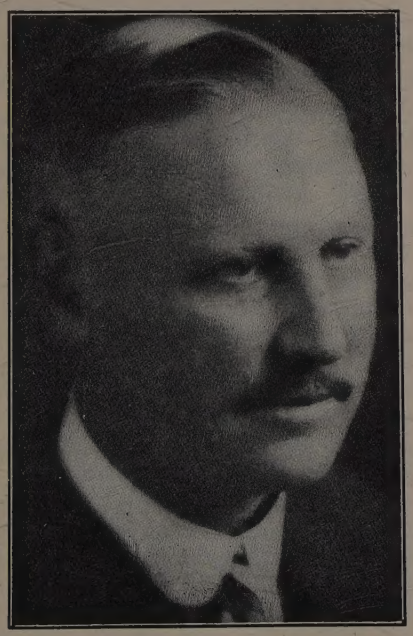
The Department commenced publishing a *Journal* in June, 1910. Since that date it has proved a valuable medium for recording the experimental and instructional work of the Department's officers, and those farmers who have been regular subscribers have gained invaluable advice from its pages. The work carried out in New Zealand compares favourably with that in any other country in the world.

However, it is unwise to rest on our laurels. State aid to agriculture is being intensified in almost every country, and with the increased competition on the available markets we must do

everything in our power to maintain production of commodities of the highest quality. In the carrying-out of this policy, the Department of Agriculture will play an important role. Its officers are equipped by knowledge and experience to guide the farmer in practically every form of agricultural pursuit, and I hope that their services are fully utilized.

The *Journal* in its new form will provide an additional avenue of instruction. It will contain the best advice we can give the farmer from month to month, and the material will be presented in a more attractive form than was possible when the pages were smaller in size. The new make-up of the *Journal* is in line with modern magazine practice, and a feature of future issues will be the illustrations.

It is my hope that the new publication will eventually be read by every farmer in the Dominion. We are living in a scientific age, and unless we exploit the resources of science we cannot claim full efficiency. It is the primary function of the Department of Agriculture to help the farmer in the practical application of scientific principles, and in this work the *Journal* will provide a vital link between the departmental experts and the man on the land. Thus I commend to farmers throughout the Dominion this new publication.



Mr. T. A. Duncan,

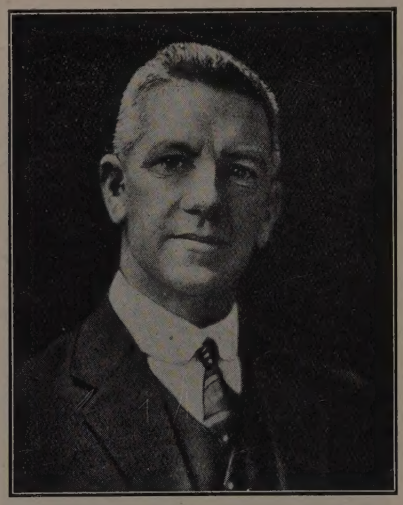
Chairman of the New Zealand Meat-producers' Board.

THE decision of the Department of Agriculture to enlarge the scope of the *Journal of Agriculture* in order to provide a more comprehensive written instructional service for farmers will, I think, be welcomed by all engaged in primary production. The practical application of scientific principles to agriculture is the surest method of achieving success in agriculture, and if the results of the researches and experiments of the Department's officers can be presented to the farmer in a form which is readily understandable the value of this work will increase manifold.

As Chairman of the New Zealand Meat-producers' Board, I am constantly concerned with the maintenance of the highest quality in our meat exports, and I wish to emphasize that that quality can be achieved only by sound principles of breeding, feeding, and management. It costs just as much to rear a poor animal as a good one, and if farmers would always bear this precept in mind they will have little to fear from their competitors on the markets of the world. This country is blessed with an unrivalled soil and climate, and it is only by producing the best grades of commodities that we can fully exploit our wonderful natural resources.

In the work of maintaining our reputation for quality the officers of the Department of Agriculture can be of the greatest assistance. They have the resources to carry out experiments in all phases of farming, and if they can more widely disseminate their knowledge and experience the Dominion as a whole will benefit accordingly.

I wish the new *Journal* every success and hope that it will receive the support it deserves from the farming community.



Mr. A. J. Murdoch,

Chairman of the New Zealand Dairy Board.

AS Chairman of the New Zealand Dairy Board, I welcome the decision of the Department of Agriculture to enlarge the scope of the *Journal of Agriculture*, especially in the direction of presenting information to farmers in a more popular form. Since its inception the *Journal* has maintained a high standard for authoritative utterance

on a wide range of agricultural subjects, but unfortunately much of this valuable material has been written up in a too formal manner for general reading by farmers. Thus the change-over to a more palatable style of presentation should not only increase the number of readers, but, more important still, the valuable information and advice which the departmental officers have to offer will be more widely distributed.

The dairy industry, in common with all other activities, has its difficulties and its problems, and these can be eradicated or alleviated only by the continued efforts of the scientist, the instructor, and the man on the land. Let us take a concrete example: Recently the Dairy Board secured the services for a term of Dr. G. J. Hucker, of the New York State Agricultural Experimental Station. Dr. Hucker, in collaboration with officers of the Department of Agriculture, has carried out some valuable research into mastitis in dairy cows, and the next problem is to see that the results of his researches reach the farmer. In this work the written word is an essential factor, and the *Journal* can take a valuable part in imparting to the farmer the latest and best advice. The activities of the Department's officers cover every phase of agriculture, and if they use the *Journal* as a written instructional service their work will be widely felt.

I have great pleasure in congratulating the Department on its new venture, and wishing it every success.

Mr. A. E Knowles,

Chairman of the New Zealand Poultry Board.

CHANGE and progress go hand in hand, and it is an inevitable sign in any progressive industry to find changes, sometimes small and slow, sometimes large and even revolutionary, being made to correspond with the movements of the times and the benefits of increasing knowledge.

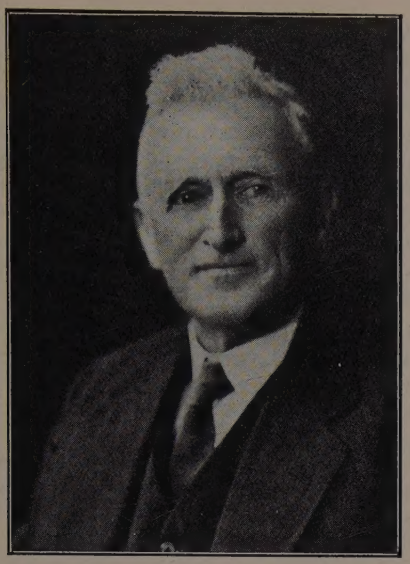
The poultry industry is no exception. The estimated value to the Dominion of its production in eggs alone is £3,000,000 annually, a fact which attests to the place it holds amongst our primary industries. In the passing of time changes are apparent, and the nature of these changes indicate the existence of a progressive spirit amongst those men and women who compose the industry.

There are in the industry to-day men who have made a substantial success of poultry-farming, and their years of experience and hard work have built up plants of which they are justifiably proud. Past failures and difficulties have been the inspiration which brought them to their present position. They are at once a spur and an inspiration to other commercial breeders and egg-producers who, in attempting to emulate them, are building for a sound future. Fast disappearing are the days when any shed was good enough for fowls, and any fowls were good enough for the production of eggs, and any eggs were good enough for the consuming public. The modern outlook turns first to the consumer upon whom it is becoming increasingly recognized the success of the efforts of poultry-farmers depends. Evidence of this changed outlook is found in the almost unanimous desire of poultrymen for a better system of marketing, which will safeguard them by first guaranteeing to the consumer a quality product.

Sounder breeding principles are being applied, better systems and equipment are available, more modern ideas are being adopted in management, and business principles are not neglected. All these are factors which make for progressive development, and an adherence to them will place the industry in the place of importance it merits. The destiny of the industry is in the hands of those men forming part of it, and it is their responsibility to recognize, just as those older established poultrymen learned to recognize, that there are no short-cuts to success.

The instructional staff of the Department of Agriculture have been a real factor in the advances made in recent years in the poultry industry. It is an unfortunate fact that owing to numerical weakness their services are necessarily restricted. Poultrymen to-day, both large and small, look to the Department for a lead in many of their practical problems. Their cry is for more instruction, and the Government will be doing less than its duty if it neglects this cry much longer.

The introduction of a new *Journal* of practical subjects is to be welcomed, supplementing, as I have no doubt it will, the instruction given by departmental officers. Study and instruction of those numerous day-to-day problems on the average poultry-farm is more desirable now than ever before, and I am sure poultry-keepers will join with me in wishing the new venture every success.



Mr. H. E. Stephens,

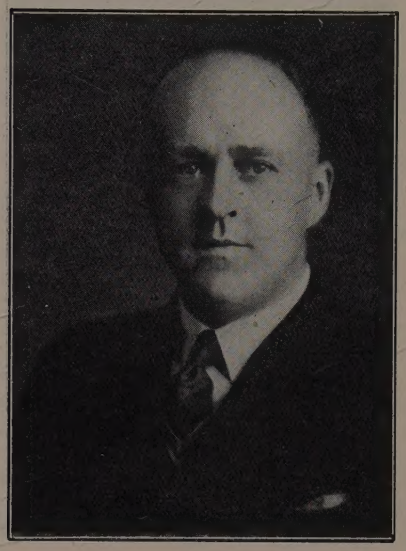
Chairman of the New Zealand Fruit-export Control Board.

I AM indeed pleased to learn that the Department of Agriculture has decided to extend its present extensive sphere of usefulness to the primary producers by arranging that in future the Department's *Journal*, in addition to publishing scientific articles, will publish popular articles informing the farmer of the benefits arising from scientific work, and explain in simple terms the meaning and implications of the scientific findings. This extension of the *Journal's* work, I feel sure, will be a most popular move.

For many years past the fruit industry has derived much benefit from the services of the Department and its *Journal;* in fact, it can almost be said that the industry owes its present standing in the primary products of the Dominion to the zeal and encouragement of your late director of horticulture, the late Mr. T. W. Kirk. It was he who emphasized the possibility of New Zealand becoming an important competitor in the world's fruit markets. Unfortunately, Mr. Kirk did not remain long enough in office to see the fruits of his labour. His successor in office, Mr. J. A. Campbell, worthily carried on the good work, and to him is due the credit for the high standing of New Zealand fruit in each of our overseas markets. The extensive and intensive instruction given by field officers and the *Journal* in the economic production of high-quality fruit has enabled this Dominion, so far removed from the world's markets, to set a standard for quality and reliability that to-day the industry's contribution to the wealth of the Dominion is of importance.

To-day, in common with all fruit-producing countries, our fruit industry has economic problems to face, but the continued zeal of our growers, backed by the reliable service of the Department and its *Journal* should enable us to be among the foremost to solve these difficulties.

I wish your extended *Journal* a long and useful life.



Mr. J. R. Butland,

Chairman of the New Zealand Honey Control Board.

I HAVE great pleasure, in response to your request, in conveying a message on behalf of the New Zealand Honey Control Board for inclusion in the issue inaugurating the enlargement of the scope of the *Journal of Agriculture.*

I am sure such a progressive move will meet with the fullest support of the primary producers generally, particularly the beekeeping industry. There is no primary industry where those engaged are so ready to help fellow-producers by the dissemination of knowledge which is likely to produce better results and greater production than beekeepers.

I have often had the unique experience when attending producers' field days of finding commercial producers, who depend upon honey-production for their living, lecturing and demonstrating, to all who attend these gatherings, their latest discoveries to increase production, eradicate disease, and many other matters calculated to assist the lesser informed producer to more efficiently manage his business.

Such being the attitude of those engaged in the production of honey, any additional avenues for the distribution of knowledge must tend towards more efficiency in industry. The future policy of the *Journal of Agriculture* will make more readily available much of this important information, which is of general interest to beekeepers and value to primary producers as a whole.

Therefore, on behalf of the industry, I congratulate you on the step contemplated and assure you of the fullest co-operation of this Board and honey-producers generally.

Mr. W. W. Mulholland,

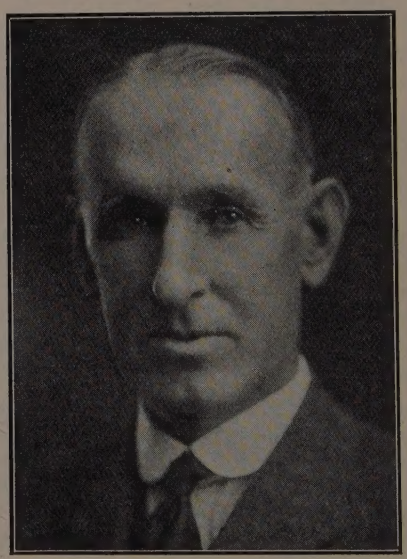
President of the New Zealand Farmers' Union.

I AM pleased to have the opportunity of addressing a few words to my fellow-farmers through the medium of the new *Journal of Agriculture*. I have had the pleasure of being a subscriber to the *Journal*, as we have always been in the habit of calling it, in its old form since its first issue. Indeed, I have the first issue in my possession yet. Often a single article has been worth a hundred times its yearly subscription to me. Its pages gave us information on various matters, such as a "new" milk-fever treatment (pumping up the udder), ante-partum paralysis, emulsification of oil for spraying, carrying of club-root infection by sheep, and germination injury of small seeds, to mention one or two items from the mass of valuable information which its pages have contained since that first issue came into my hands.

Nevertheless it must be admitted that much of its contents has been difficult reading for most farmers who are not closely acquainted with highly technical literature. Some of it, indeed, has been almost unintelligible to the ordinary farmer. Admitting the necessity for finding a means of publishing these highly technical articles, nevertheless their inclusion in the *Journal* has made it unattractive to the ordinary reader and its circulation has remained far too small in consequence. The decision to exclude them from the new *Journal* and publish them separately is therefore welcome.

The need of the day is to get the information available in the laboratory and in the experiment station to the farmer in a form in which he can assimilate it and so be able to devise means of making practical use of it. The finest agricultural research work is largely wasted effort unless means are available to turn its results into farm practice, and I understand that the aim of the Department in issuing the *Journal of Agriculture* in its new form is to make it the vehicle through which the knowledge gleaned from time to time by research workers will be transmitted to farmers in a form in which they can understand it and apply it to their farm practice.

As the chief executive officer of the New Zealand Farmers' Union I congratulate the Department on the step that they have taken, and I commend the *Journal* to the farmers of the Dominion. Every farmer should look forward eagerly to its appearance in his mail-box month by month, and he should keep the past numbers permanently on his bookshelf for ready reference from time to time.



Mr. H. D. Acland,

President of the New Zealand Sheepowners' Federation.

AS President of the New Zealand Sheepowners' Federation, may I be permitted to extend to you, on behalf of sheepowners, my appreciation of the departure that is being made with respect to the issuing of the *Journal of Agriculture*, with a view to enlarging its scope of usefulness to the great body of farmers.

I feel sure that the issue of a second *Journal* on a quarterly basis, dealing with the scientific and technical side of primary production, will be a valuable departure and one much appreciated by the farming community generally, while the monthly issue,

which will be solely instructional and advisory, should enable your Department to add considerably to the value of its work in the interests of primary production, as provided in the Department's monthly *Journal* in the past.

The more scientific articles dealing with farming matters can then be filed separately for particular reference, while the new monthly issue should, as you suggest, provide for fuller reports on the valuable field-work done by your officers and the practical results of research being carried out by you in the interests of the various branches of primary production, as well as matters of general interest and results of experiments from overseas.

I feel sure there is scope for an extension along the lines suggested, and on behalf of the New Zealand Sheepowners' Federation I extend to the Minister, to yourself, and those responsible, cordial good wishes for the success of your new *Journal*, the object of which is to still further increase the value of the service given to the farming community.

Personally, I feel assured that the alteration now proposed will be a valuable addition to the great services rendered by your Department, both in research and field-work carried out by your officers throughout the Dominion.

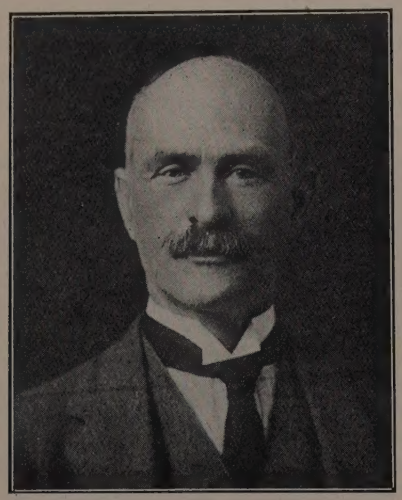
Mr. W. F. McLaren,

Dominion President, New Zealand Federation of Young Farmers' Clubs (Inc.)

IN offering congratulations to the New Zealand Department of Agriculture on the publication of the first number of the new issue of the *New Zealand Journal of Agriculture*, I do so on behalf of the members of the New Zealand Federation of Young Farmers' Clubs, and also personally. The *Journal of Agriculture* has given good service in the past to the farmers of the Dominion, and the Department is to be commended on its determination to extend further the written instructional side of its work. It is no exaggeration to state that the future welfare and prosperity of the country depends to a great extent on the solution of our many problems not only economic and social, but also agricultural and pastoral. The scientist and research worker have contributed much towards the advancement and progress of farming, and if we, as a farming community, are to hold our own, we must be prepared to take full advantage of the opportunities offered to us. The *Journal of Agriculture*, working hand in hand with the Department's excellent instructional service, can become a definite aid to the farming community in the solution of its problems.

As this issue marks the adoption of the *Journal of Agriculture* as the official organ of the New Zealand Federation of Young Farmers' Clubs, I feel that I should thank the Department for the offer that has made it possible for the Young Farmers' Clubs' organization to have its own section in what, I am sure, will become one of the most valuable of the farming publications. I also congratulate the Federation on its acceptance of that offer, for I consider that the closer association of the Young Farmers' Club movement with the instructional service of the Department of Agriculture is a step in the right direction. I wish to pay a tribute to the work that has already been carried out by the Department in fostering the Young Farmers' Clubs' organization. One cannot praise too highly the New Zealand Farmers' Union and other kindred farming organizations for the help so generously accorded to the movement since its inception in 1933. With the assistance of the Department of Agriculture the movement was reorganized in August, 1936, on broad, national lines, and to-day we can proudly point to the fact that we have 138 individual clubs throughout the Dominion, with a total membership rapidly approaching the four thousand mark. Without the organization and co-ordination that has been made possible through the co-operation of the Department and its officers, much of what has been done could never have been accomplished.

I wish to include a personal message to Young Farmers' Club members; I want you all to realize that this organization, of which you are so rightly proud, is your own organization, and that you have it in your power to make it not only useful to yourselves but of immense importance to the Dominion. I, and many others, are prepared to do all that lies within our power to further your interests, because we feel that the future of farming, in fact the future of New Zealand, is wrapped up in the progress of the Young Farmers' Clubs. My advice to you is to help yourselves and your fellow members by keeping your organization alive. To use a popular expression, "*Its up to you!*"



Mr. Arthur Morton,

President of the North Island Dairy Association.

THE decision of the Department of Agriculture to make considerable alterations in regard to their well-known monthly publication, the *Journal of Agriculture*, will have the commendation of the farming community.

The suggestion to, in future, omit from the *Journal* matter which is almost entirely of a scientific character and to replace it by articles written in a more attractive form and of an advisory and instructional nature will undoubtedly be the means of making the *Journal* much more popular to farmers.

With the highly capable staff of the Department to draw upon, and taking into consideration the very wide field of the operations of the same staff and their varied experiences, there should be no difficulty in offering to the man on the land a valuable monthly paper which will assist him in his many and sometimes difficult problems in relation to his farming operations. One of the greatest needs of the Dominion to-day is to inculcate in the minds of our young men the "farming spirit," and if the *Journal* in its new form can do something towards attaining this desirable objective, then the change will have been well worth while. I have no doubt that, in keeping with the magnitude of the dairying industry, a very considerable part of the new issue will deal more particularly with matters of especial interest to the dairy-farmer and will, I trust, receive their hearty support.

Wishing the new venture a long and successful career.

Mr. H. H. Meredith,

Chairman of Directors of the South Island Dairy Association.

THE welfare of the people of this Dominion is very largely dependent on the success of the farming or primary industries, and that being so the Department of Agriculture, in my opinion, is one of the most important of all the Government institutions which this country possesses in abundance.

The Department has done excellent work in the past in fostering and developing the many branches of industry associated with agriculture, and I have no doubt it will continue to render valuable service to the farming community and in the interests of the country generally.

I understand the Department proposes to enlarge the scope of the *Journal of Agriculture* with the object of making the publication more attractive to the man on the land. Anything that the Department can do by way of imparting information to farmers that will assist them in their work is well worth while.

I trust that the people engaged in the various branches of farming will whole-heartedly support the Department's desire to increase its usefulness and that the new *Journal of Agriculture* will meet with the success which I am confident it will merit.

NEW ZEALAND'S GREATEST DAIRY BREED— THE FRIESIAN.

FRIESIANS—The Highest Butterfat Producers.

Government Official C.O.R. for all certificates to 31st December, 1936.

		lb Milk.	lb Fat.
Friesians	average	14,031·9	497·26
Next Best Breed	„	8,291·3	463·16

FRIESIANS—Incomparable for Cheese-making.

Highest Casein-fat ratio in their milk gives greatest quantity of Cheese per pound of Butterfat and makes best quality Cheese.

FRIESIAN MILK—Ideal for human consumption.

FRIESIAN COWS—Their Strong Constitution

ensures minimum yearly herd replacements and highest cash returns from surplus stock.

FRIESIANS for PIG-REARING—Each Pig reared is extra profit earned.

Friesian milk makes pig-rearing a most valuable side-line to dairying.

FRIESIANS—Always the dairy-farmer's choice after a fair trial.

Dairy-farmers—Be guided by the experience of a Canterbury farmer.

1932-33	season.	Non-Friesian herd averaged	189	lb fat.
1935-36	„	FRIESIAN „	400	„ „
1936-37	„	FRIESIAN „	413	„ „

DAIRY-FARMERS—The HIGHEST RETURNS are within your reach when you own a ***FRIESIAN HERD.***

A copy of the latest Friesian booklet and leaflets will convince you that the shortest cut to PROFITABLE DAIRYING is with a FRIESIAN HERD. Write for your copies immediately to—

Secretary, N.Z. Friesian Association,
Box 765, Auckland.

The Department of Agriculture.

Outline of Organization and Functions.

THE development of the Department of Agriculture has run parallel with the progress of the Dominion's primary industries. As these industries have expanded, greater calls have been made on the Department, either in the administration of Acts and regulations devised to safeguard the interests of agriculture and the State generally, or in investigational, advisory, and instructional work planned for the purpose of assisting the agriculturist in the solution or alleviation of his problems and difficulties. The farmer's problems are the Department's problems, and it has long been recognized that the closer the collaboration the greater will be the common achievements.

With the reorganization of the *Journal of Agriculture* with the object of giving a much wider instructional service to the rural community, it is fitting in the first issue of the new publication that the ramifications and activities of the Department should be outlined so that farmers may be fully acquainted with the facilities available to them. The functions of the Department range from instruction in all phases of farming to inspection and grading of produce in the Dominion, and a supervision of products arriving in the United Kingdom. Within New Zealand the staff is stationed at strategic points throughout the country so that every farmer may be given the necessary service.

The organization of the Department is so arranged that direct liaison is maintained between its various activities and the Minister of Agriculture, who is the supreme head of the organization. Sections dealing with different branches of work are arranged under one of five heads as follows :—

(1) Head Office.
(2) Live-stock Division.
(3) Dairy Division.
(4) Fields Division.
(5) Horticulture Division.

The staffs of the Head Office and the divisional headquarters are stationed in Wellington. The desirability of allocating certain branches of primary production to the care of separate Divisions will be fully appreciated when a study is made of the range of technical matters with which the Department has to deal.

The main functions of the Head Office are :—

(1) To provide a link between the Minister of Agriculture and the Department as a whole.

(2) To put into effect the policy laid down by the Government.

(3) To co-ordinate the work of the various Divisions, and to attend to any matters which are outside the scope of Divisions.

(4) To maintain close contact with the farming community and gauge its requirements.

Head Office is principally concerned with organization and policy matters, and the co-ordination of effort aiming at maximum service to the community in an endeavour to advance the practice of agriculture in all its phases, and to ensure that quality of products is maintained.

Under the immediate control of the Head Office is the Chemistry Section, which carries out a wide range of experiments and researches. Investigations are made by the section into bush sickness, mineral deficiencies connected with plant diseases, soils, fertilizers, stock remedies, pasture contents, and other problems towards the solution of which the chemist can make important contributions.

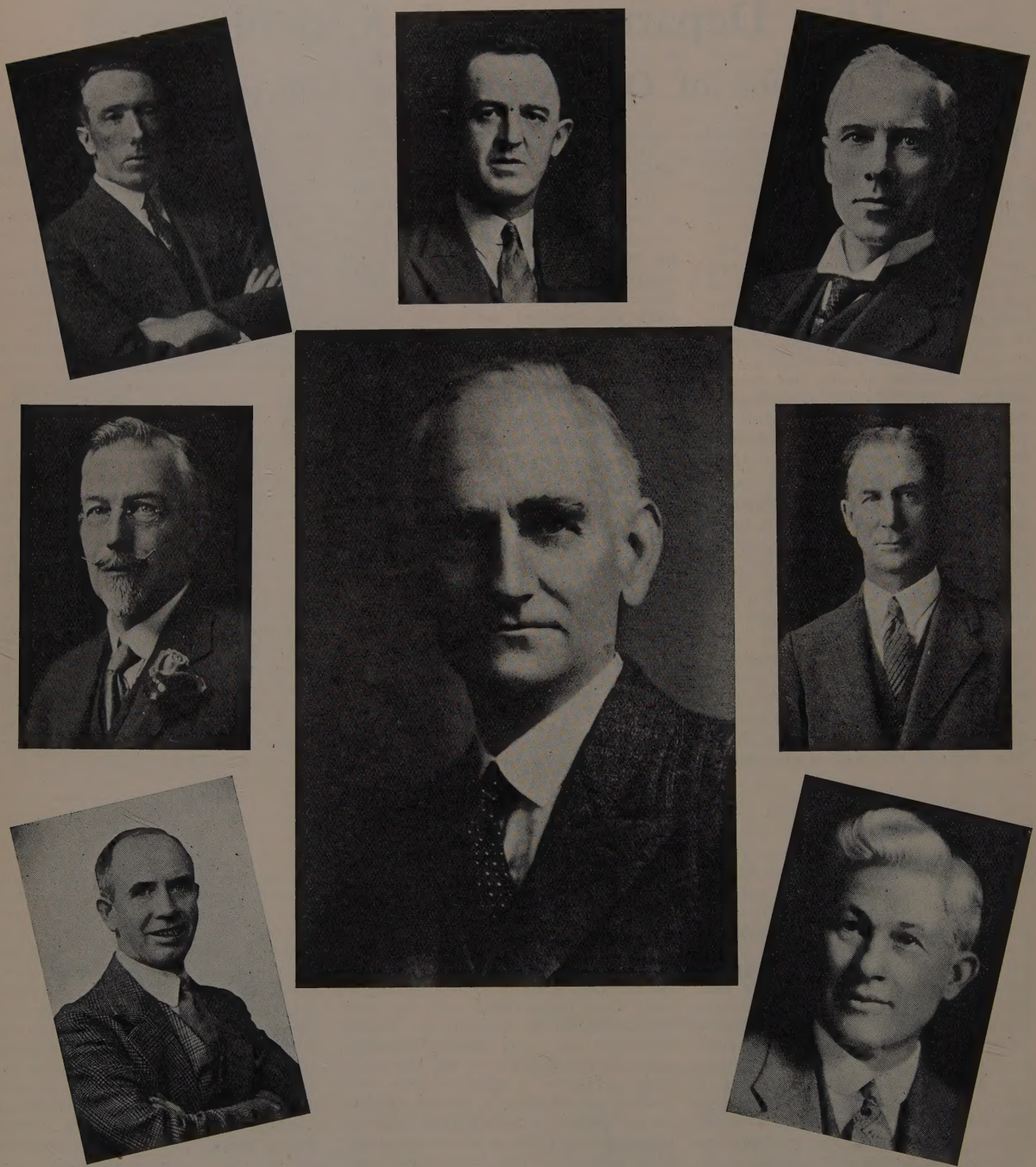
The Head Office also issues the *Journal of Agriculture*, which is the Department's official organ for dissemination of information among the farming community. In addition to the *Journal* the publications section attends to the printing and distribution of bulletins and pamphlets on special phases of the work of specialists and administrative officers.

Live-stock Division.

THE Live-stock Division of the Department of Agriculture covers a wide field of activities, its functions embracing instructional, regulatory, and public-health services. It is primarily concerned with animal health and animal husbandry. To the field staff (Veterinarians and Stock Inspectors) falls the duty of control of the stock-diseases scheduled under the Stock Act. In addition, the field staff carries out investigation into reported undue mortalities in stock, and maintains advisory service to the dairy-farmer in connection with the control of the more common dairy-cow diseases, and to the sheep-farmer in respect to sheep-management and diseases of sheep.

The Live-stock Division administers the following Acts : Stock Act, Slaughtering and Inspection Act, Dairy Industry Act (in relation to inspection of town-supply dairies), Poultry Act, Noxious Weeds Act, and Rabbit Nuisance Act.

In the administration of the Stock Act inspection of live-stock is made on farms and at saleyards, all clinically diseased animals coming under inspection being condemned. The tuberculin test is applied to cattle in suspicious cases and on the application of owners wishing to have their herds tested with the view of elimination of tuberculosis. During the past year over twenty thousand cattle were subjected to the tuberculin test, and there is some evidence that owners are showing a greater interest in the matter of ridding their herds of tuberculous animals in an effort to establish herds free from tuberculosis. Another disease of cattle which is dealt with under the Stock Act is Johne's disease. This disease of cattle, the symptoms of which are characterized by chronic scouring and wasting of the animal, is present in Taranaki and the Waikato districts. The insidious nature of Johne's disease, and the losses which it is capable of producing in dairy cattle, make it essential that efforts at controlling its spread should be instituted. Towards this end the Division has been carrying out regular tests in affected herds with the diagnostic agent Johnin, the object being the detection and elimination of early cases of the disease. At the same time advice is given to the owners regarding adoption of methods calculated to lessen the infection on the farm, such methods including drainage of swampy areas, liming of affected pastures, &c. The control of Johne's disease presents formidable difficulties, but in the meantime the best-known measures are being tried. In its efforts to cope with this disease the Division requests the co-operation of dairy-farmers in those areas in which the condition is known to occur, early reporting of suspicious cases being of definite assistance in overcoming infection on a farm.



EXECUTIVE OFFICERS OF THE DEPARTMENT OF AGRICULTURE.

Centre, A. H. Cockayne, Director-General. Top—Left, W. C. Barry, Director of Live-stock Division; centre, E. J. Fawcett, Technical Liaison Officer; right, W. M. Singleton, Director of the Dairy Division. Centre—Left, W. C. Robinson, Secretary; right, A. S. Houston, Accountant. Bottom—Left, R. B. Tennent, Director of the Fields Division; right, J. A. Campbell, Director of the Horticulture Division.

In collaboration with the staff of the Wallaceville Veterinary Laboratory, investigation into animal-disease is carried out by field veterinarians.

Quarantine and inspection of imported stock, together with the administration of those regulations having a bearing on the introduction of animal disease, is an important function in preventing the introduction of the more serious diseases present in overseas countries.

In the administration of the Slaughtering and Inspection Act the Live-stock Division carries out the important duty of inspection and certification for export of all meat and animal by-products.

The Live-stock Division also includes in its functions an important aspect of public-health work in the control of the inspection of meat slaughtered for consumption in the Dominion, and also the work of dairy inspection in relation to the public milk-supply.

Swine Husbandry.

This branch of the Live-stock Division's activities has received special attention during the past year at the following points :—

Pedigree-sow Recording. — In October, 1936, a system of pedigree-sow recording was instituted on a national basis. Field officers of the Division weigh pedigree litters at three and at eight weeks, for a fee of 5s., and, subject to the confirmation of pedigree details by the New Zealand Pig-breeders' Association, a sow performance sheet, based on these weights, is issued to the owner. A report for the year ended the 31st August, 1937, was published in the November issue of this *Journal*.

Instructional Levy.—An instructional levy of 2d. per carcass was imposed on all pigs slaughtered from the 1st May, 1937. This is estimated to produce a fund of from £7,000 to £8,000, which is apportioned on the recommendation of the National Pig Industry Council between eight District Pig Councils—six in the North Island and two in the South Island—on a territory pig-population basis. Each District Pig Council employs a Supervisor, whose duties include the establishing of Pig Clubs. Such clubs are co-operative groups of ten to fifty producers in any locality, formed for the purposes of distributing information about pigs, procuring and using better strains of pigs and better accommodation, and being the means of allowing producers a voice in the spending of the allocation made from the levy. Each Pig Club elects a representative to its District Council, which in turn elects a representative to the National Council. To date, over two hundred Pig Clubs have been formed by five District Councils.

Advanced Registry of Purebred Pigs.—It is realized that the pedigree-sow-recording scheme is incomplete, and steps are being taken to introduce a scheme of advanced registry. Under this scheme breeders will be able to take two purebred barrow pigs to bacon weight, and at slaughter have the carcasses graded on the basis of commercial requirements. Points will be allotted for prolificacy of the sow, rate of maturity to bacon weights, and on carcass-quality. Pigs reaching a defined standard will be awarded a certificate of performance.

Grading of Baconers.—Steps have been taken during the last nine months to introduce a system of grading for all baconer pigs killed at licensed slaughter-houses for export or for local consumption. It is proposed to adopt the Canadian bacon standards of back fat and loin fat, with allowances for the difference between green carcasses and cured bacon. The original idea of grading on a length basis has been dropped, but from the measurements of about 80,000 baconers supplied by the industry to this Department during the last three months it is clearly established that for pigs of any weight a reduction of ⅛ in. to ¼ in. of fat over the shoulder there is an increase of from 2½ in. to 3 in. in length. Producers may still select thin back fats by concentrating on long pigs.

Pig Census.—During the year a scheme of collecting information that will be useful from the viewpoint of instruction and for the purpose of forecasting pig-production when required from time to time has been instituted for the whole of the Dominion. Every field officer collects certain data from a number of farms every three months. This information will become increasingly valuable as the years go by, and should form the basis of a very sound instructional policy.

Research and Investigation.—There are numerous problems associated with feeding, housing, health and disease incidence, and these are all having attention.

Feeding investigations have been undertaken at Ruakura during the last year, and with the completion of the Wallaceville Laboratory the disease and infection problems will be given more concentrated attention and explored more fully than has been possible in the past.

Instruction in Wool Growing, Classing, &c.

Another activity in the interests of the farmer is that connected with the growing of wool and the proper preparation and classification of wool for the market.

Included in this is advice on the selection of the ram in conjunction with fibre examination, in order that wool faults in the flock may be eliminated and a purer wool of the respective qualities and breeds be produced. Lantern lectures and practical demonstrations are given to farmers' organizations, and individual advice is given both by correspondence and on the farm. The service also covers advice on the type of wool-shed, yards, dips, and other sheep-farm equipment, with suggested plans to meet varying conditions.

Type samples of wool are collected and prepared for educational purposes, for show exhibits, and for sending abroad.

Poultry.

An instructional service is available for poultry-farmers and is a service that is taken full advantage of by poultry-keepers throughout the Dominion. The service given in addition to advice by letter and by monthly articles of a seasonal nature in this *Journal*, embraces lectures, demonstrations and visits to plants, culling of stock, the selection of suitable breeders, judging of birds on points at egg-laying competitions, and the grading of eggs for export.

An experimental, demonstration, and breeding station is maintained at Wallaceville, near Wellington, where approximately two thousand high-class utility White Leghorns and Black Langshans are stocked. This station enables experimental tests on feeding, &c., to be carried out, and is also very largely availed of by poultry-keepers who desire breeders from tested stock. Visitors are welcome to call at this station on any week-day, and visiting poultry-keepers to Wellington avail themselves of this opportunity, and thus can discuss on the spot the various experiments carried on and other aspects of poultry-farming on which they desire to be informed.

The number of householders keeping fowls or ducks is shown as 165,949, and of this number, 31,801 have flocks of 25 and over, and 3,219 have flocks of 100 and over.

Rabbits.

The control of the rabbit pest of the Dominion is one which requires constant attention if the pest is not to be allowed to take control itself, and the work of Rabbit Boards formed under the provisions of the Rabbit Nuisance Act, together with officers of this Division operating in co-operation with Boards and administering the Act in districts where Boards have not been formed, has to be continuous and watchful, as experience has shown that it would be fatal to "let up" on the pest in any way. Rabbit Boards have done very valuable work in the control of the pest in districts where they have jurisdiction, and this method of control is given every encouragement by paying a subsidy on

the rates collected. Many properties which to-day are fully productive would not be in that position if rabbits had been allowed full liberty.

Noxious Weeds.

This is a section of the Division's work which may possibly be said to give the least satisfaction to either the farmer or the officers concerned in the administration of the Noxious Weeds Act, but here again it might truthfully be said that but for the efforts of the officers of the Department taking part in this work the production of many properties would to-day be infinitely less than it is.

Many farm properties are menaced by noxious weeds—gorse, blackberry, ragwort, Californian thistle, variegated thistle, and many others—to such an extent that the task was one quite beyond the financial capacity of the occupier to tackle.

With the assistance of the Labour Department, which has granted a very generous subsidy for certified labour, and an allocation by the Department of Agriculture to cover the remainder of the labour-cost and to provide for the requisite destroying agent, arrangements were made with County Councils last season, and continued this season, to carry out work within their areas, particularly on ragwort, and through this very good work has been done, and lands that would otherwise have been abandoned have been so improved as to allow them to be continued as productive properties. In a number of counties the administration of the Act is now in the hands of the County Council, and this policy should expand.

Advisory Service.

In all the work of the Division the instructional aspect is kept in the foreground, and although much of the work is necessarily of an inspectional and regulatory nature it is linked up with advice on stock management and feeding, &c.

The Veterinary Laboratory, Wallaceville.

THE Veterinary Laboratory at Wallaceville has two main functions, the one to diagnose diseases from material forwarded for examination from farmers and Government officers, and the other, with the grant and staff at its command, to conduct research into disease of a serious nature affecting stock.

Diagnosis of the many troubles affecting all classes of stock from horses to poultry is an interesting task, but one which presents many difficulties, for frequently the results of the investigation show that the condition is one about which too little is known for the laboratory officer to be able to convey to the field officers the best means of control. This, however, is not always the case, for the many years of experience in diseases occurring in all districts of New Zealand have given those officers engaged in diagnostic work at Wallaceville a very fair knowledge of what to expect from specimens and how to prevent the troubles on account of which specimens are sent.

The Laboratory is situated on a farm of 100 acres and laid out in small paddocks containing stock for experimental purposes. Breeding of animals, such as rabbits, guinea-pigs, mice, and rats, is also carried out extensively in comfortable sheds, as those who have visited the institute know.

Situated on the Laboratory farm is a poultry station, which also is devoted to experimental work.

Wallaceville is linked up through the newly formed Animal Health Bureau with all other institutes in New Zealand interested in animal health, and is also closely connected with the whole field staff of the Department of Agriculture. It is through this latter staff that the findings of the Laboratory filter out to the stock-owner.

View of Wallaceville Laboratory.

Although much work has been performed by the Laboratory staff in the past, yet much has still to be learned of disease. The aim of all research officers is to prevent disease occurring by finding what is required to prevent stock becoming sick. For example, it has been shown that feeding of magnesium prevents grass staggers, of cobalt, bush sickness; vaccination will prevent pulpy kidney in lambs, blackleg in calves, black disease in sheep, or distemper in dogs; improvement in winter feeding will prevent ante-partum paralysis in ewes, and control of pasture prevents facial eczema. Such are the methods which must first be found by the research officer and then accepted by the farmer. Serious attempts to find simple control methods for diseases such as mastitis and temporary sterility have so far failed, but some simple method may yet be evolved.

The herd of cows at the Laboratory numbering about thirty-five and the sheep flock of over one hundred ewes are used exclusively for experimental work, the cows mainly for mastitis and sterility and the sheep for parasite control.

In recent years adoption of more intensive farming methods and the consequent development of artificial conditions have resulted in an increase in disease in stock, rendering still more necessary a close co-operation with Wallaceville. It is hoped that the stock-owner will realize this and will welcome any extension of the work which is designed to prevent losses in stock from disease. Survey officers will shortly be at work in parts of the country investigating conditions on farms with a view to alleviating loss. It is expected that every assistance will be given such investigational officers, for the help of the farmer is essential to the research officer, as is the work of the research officer to the prosperity of the farmer.

Service to the Dairy Industry.

THE Government dairying service, commenced in 1889 under the Lands Department, had two main objectives, and though the great development of the dairy industry during the intervening years has necessitated a considerable extension of Government assistance and supervision, the principal functions of the present Dairy Division (formed in 1898) are still those which the founders of a State dairying service had in view. Those functions are (1) to supervise and give advice on the production, as economically and scientifically as possible, of high-quality butter and cheese; (2) to place on overseas markets, particularly the British market, in good order and condition, dairy-produce suited to the requirements of that market. The Division's functions are therefore chiefly educational, protective, and administrative. Moreover, they pertain entirely to the manufacturing side of the industry, and are not associated with the production of milk or cream for local consumption.

The necessary statutory authority for the Division's work is provided by the Dairy Industry Act and the regulations thereunder, which the Division administers.

Assistance to Producers.

The Government dairying service began as an instruction service, the grading of butter and cheese being added later (1894). Instruction and grading, with their essential subsidiary services, are the channels through which assistance is rendered to New Zealand's dairy-producers. In the beginning instruction related solely to the manufacture of butter and cheese, but for many years has included the production of the raw material, and to-day the Dairy Division assists the industry from the cow to the consumer of the finished product.

Assistance by officers of the Division commences before the dairy factory is built, advice being given in the selection of a suitable site for the factory, and later with regard to building plans and dairy plant. Site, structure, and equipment of all new dairy factories must meet with the approval of the Director of the Dairy Division, and the plans must also be approved by the Minister of Agriculture. Every factory requires to be registered, and registrations are subject to the approval of a Dairy Instructor to the general effect that the building, plant, and surroundings comply with the statutory requirements governing the matter.

Instruction on Farm.

When the factory is ready to receive supply, Farm Dairy Instructors, who are under the direct supervision of the Butter and Cheese Instructors, assist and advise the suppliers regarding the care of milk and cream, as well as in the care of milking-machines and farm separators. The Farm Dairy Instruction service, however, is not yet Dominion-wide, only about one-fourth of our dairy companies at present supporting the scheme. Its extension to include all suppliers to dairy factories would represent an important advance in the organization of the industry.

The most important work of the Division is that done by the Dairy Instructors and the Dairy-produce Graders. The Dairy Instructor spends most of his time in the factory, assisting to solve the problems of the factory-manager, endeavouring to maintain uniformity of method and to ensure the manufacture of a uniform and high quality product. The Dairy-produce Grader grades the produce, allotting points under the various headings laid down by the regulations. A copy of the grade note goes to the dairy company, and in the case of faults which the factory-manager cannot rectify the Dairy Instructor is called in, so that he provides a link between the dairy factory and the Dairy-produce Grader. He is truly the guardian of quality.

Grade Certificate.

The grade certificate has all the significance of a commercial document, being the accepted basis for the sale and purchase of dairy-produce, while it is also the determining factor for payments under the guaranteed-prices scheme. It is also the Grader's duty to carry out certain checks to ensure that there is no contravention of the regulations pertaining to weights of dairy-produce, salt and moisture content of butter, and to the composition of cheese. Moreover, his supervision and authority extends to the container in which the produce is packed.

Services of a more routine nature, but nevertheless exceedingly important, relate to maintenance of uniformity of milk and cream grading, the examining and certificating of milk and cream graders, the testing of glassware used in testing milk and cream to determine the pounds of butterfat for which each supplier should be paid, check testing at dairy factories to ensure that the testing is being done accurately. In addition, chemical and bacteriological work is carried out at the Wallaceville Laboratory, and is conducted along lines which enable it to be linked up with the grading and instruction service.

Inspection in London.

The final stage in the Division's service to the industry is the inspection of dairy-produce in England. Three officers of the Dairy Division are stationed in London and report to New Zealand on the condition of New Zealand dairy-products on arrival in the United Kingdom, and investigate any special complaints respecting quality, packing, &c., also assisting in the adjustment of claims for compensation through the Primary Products Marketing Department's London officers.

These are only the more important branches of the Dairy Division's services to the industry. Casein has not been mentioned, nor dried milk and allied products, nor the design and equipment of milking-sheds. In all these things the Division plays a part. A more or less independent unit of the Division's activities is the certificate-of-record and Government official herd-testing of pure-bred dairy cows—services which have assisted considerably in the building up of New Zealand's dairy herds. Officers of the Division also carry out the judging of competitive exhibits of butter and cheese at all the more important shows, while much educational work is done by means of grading competitions for factory-managers and addresses at various conferences and other dairy industry functions.

The salaries and expenses of Dairy Instructors are, and always have been, paid from the Consolidated Fund. The Government pays half the salary of Farm Dairy Instructors. The grading service is, by means of a small grading fee, self-supporting. In proportion to the value of New Zealand's huge output of dairy-produce, and to the service rendered, the cost of the Dairy Division to the industry is remarkaby moderate.

Activities of the Fields Division.

THE Fields Division was primarily established as an advisory service for farmers.

The Division's objective is to bring about improved farm practices, and during the fourteen years of its existence its activities and its influence on the farming practices of the Dominion have expanded to a remarkable degree. In the first few years since its inception the extension officers had such wide districts to cover that it was quite impossible for them to cope adequately with the numerous requests for assistance. The position has now materially improved, and every important farming district has at its disposal a fully qualified Instructor in Agriculture whose services and advice are freely at the disposal of all farmers.

Farmers' Advisory Service.

It is the aim of the Division to afford to all farmers sound advice on such problems as subdivision, drainage, cultivation, seed-mixtures, pasture-management, top-dressing, manuring, crop-improvement, or anything of a like nature. Visits to farms are made whenever necessary, and advice by correspondence also forms a large proportion of an Instructor's work. The Instructor serves as a clearing-house for all information relating to recent research in agriculture and for the wealth of material at the Department's disposal, and the personal contact between farmers and Instructors is regarded as one of the most valuable contributions which the Division affords our rural community.

Activities of the Fields Division: Seed-testing.

Seed Certification.

Commencing in 1927 with potatoes and wheat, seed certification now occupies a very prominent place in the activities of the Fields Division, and now embraces all the principal grass and clover seeds produced in New Zealand.

Seed certification has been twofold in its reaction on New Zealand agriculture.

In the first place, it has enabled New Zealand farmers to procure seeds of assured quality, thereby contributing to the general improvement of pastures and crops, with consequent increase in production or improvement in quality of production.

In the second place, it has enabled overseas firms to buy New-Zealand-grown seeds of the best quality with full confidence, whereas previously the selection of high-quality strains was a matter mainly of chance.

Both the above reactions naturally carry in their train many subsidiary

A Panorama of Ruakura Farm of Instruction.

reactions, but all these may be looked upon as the result of one or other of the above mentioned.

In regard to all crops, certification has meant that all those interested in the sale and purchase of seeds have been able to carry out their negotiations in regard to certified seed, with the fullest confidence that the produce they are handling is of the highest standard in regard to strain-quality. This confidence is based on the knowledge that certification is undertaken by an impartial body, which assures itself by all the necessary tests that the strain of seed is as described by the label under which it is certified.

Irrigation Farming.

With the extension of irrigation in the South Island it was realized that guidance to farmers on the irrigated areas was of fundamental importance, and officers who have made a close study of irrigation farming are available for the purpose of giving advice on such matters.

Agricultural Training.

Seed-testing Station.

The New Zealand Seed-testing Station at Palmerston North has been of incalculable value to farmers in determining by means of the purity and germination tests the value of seed sold throughout the Dominion. The recognition of the value of the work by the seed trade generally has resulted in merchants being able to recommend with the greatest confidence the seeds in which they are trading, such seeds being backed by official tests for germination and purity carried out with the latest modern equipment. It is of interest that the New Zealand official station is the only one in Australia and New Zealand recognized as an official station by the International Seed-testing Association. The Station also carries out the ultra-violet-light test for the determination of perennial-rye-grass types and the picric-acid test for the determination of white-clover types.

Agricultural Training.

The training of youths to fit them to become efficient farmers is another phase of the Division's activities. The Ruakura Farm Training College near Hamilton and the Flock House Station near Bulls are both engaged in work along these lines. The Ruakura course is primarily intended for the sons of farmers so that they may become better acquainted with modern farming along practical lines before taking over from, or assisting their parents with, their farms. The Flock House training is in the main intended to train boys in the elementary phases of farm-work, handling of implements, &c., and is supplemented by apprenticeship for three years to farmers, who will afford further training to the boys as agricultural workers and potential farmers.

A Successful Crop of Mangels.

Young Farmers' Clubs.

The Young Farmers' Club movement, which is a world-wide development of recent years, is fostered and encouraged by the Fields Division, and the services of the local advisory officers are available to the clubs throughout the Dominion. The potentialities of the movement are considerable, and the Division is making every endeavour to ensure that the organization and development shall proceed along sound lines. Financial assistance is given to the clubs in the shape of a grant, and the Division has appointed a member of its staff to act as a full-time organizing secretary.

Experimental Work.

Nearly one thousand experiments are in progress throughout the Dominion with various crops, seed-mixtures, and

manures under trial. Modern experimental technique demands exactitude in planning and measurement and the statistical interpretation of results. The Division's experimental work has since 1928 been planned along these lines. Much of the experimental work is put in hand with the object of obtaining localized knowledge, as it is recognized that many problems are incapable of solution other than in the district in which they are of most moment. On the other hand, there are problems which are of wider significance and which can be systematically attacked only at centres such as the research stations at Ruakura and Marton. The necessity for a research station to deal with problems of particular moment to Otago and Southland is apparent, and it is anticipated that the establishment of such a station will be an accomplished fact within the near future.

Flax Industry.

Land Utilization.

A comparatively recent development of the Division's activities has been the land utilization survey. In reality the object of these surveys is to obtain accurate information relative to agricultural conditions, development, and trends in the various districts. A commencement has been made with the Hawke's Bay district, where considerable progress has been made. Ultimately the survey will be extended to other districts. Valuable information has already been secured which must have a bearing on the development of future farm practices in the district.

Crop Utilization.

This service, which has just recently been inaugurated, deals with marketing problems in connection with the various annual crops and advisory work generally in regard to marketing, including the grading, packing, processing, storage, and export. It is generally appreciated that a great deal of the benefit arising from technical advances in agricultural production may be lost if unstable market conditions prevail. In recent years a certain measure of State co-operation with producing industries has been effective in checking violent fluctuations in prices. For certain products duties and import restrictions are imposed, for others there is required supervision of grading and packing for export to remove an unmarketable surplus, while in still other cases price agreements can be arranged between the producers and the consumers.

Agricultural Instruction.

Apart from the above brief summary of the Field Division's activities, other phases of work are under its control, such as flax-grading and inspection of fertilizers, all designed to serve the farmers' interests. The salient feature of the Division's work, however, is that of being a friend to, and adviser of, the farming community, and no farmer when in need of advice should hesitate to consult the local Instructor in Agriculture.

Horticultural Instruction.

THE main activities coming within the scope of the Horticulture Division are the control of the fruitgrowing and beekeeping industries in the Dominion; and in this connection it administers the regulations under the Orchard and Garden Diseases Act, 1928, and the Apiaries Act, 1927. Other Acts affecting the work of the Division are the Fruit-export Control Act, 1924; Honey-export Control Act, 1924; Orchard-tax Act, 1927; Fireblight Act, 1922; N.Z. Institute of Horticulture Act, 1927; Seeds Importation Act, 1927; Fungicides and Insecticides Act, 1927; and Introduction of Plants Act, 1927.

The staff of the Division consists of a Director, Assistant Director, 24 Orchard Instructors, 6 Fruit Inspectors, 7 Apiary Instructors, Senior Apiary Instructor, Horticulturist, Cool Storage Officer, Vine and Wine Instructor, and Tobacco Instructor, the five last named being specialized officers. The clerical staff comprises six officers.

Orchard Instructors are stationed in the main fruit-growing districts in the Dominion, and their duties consist of the inspection of orchards and affording advice and instruction on orchard management generally; control of disease and insect pests; carrying-out of manurial and spraying experiments; inspection of nurseries; inspection of fruit for export, &c.

The Fruit Inspectors are stationed at the different ports of entry for fruit, plants, &c.—viz., Auckland, Wellington, Christchurch, Dunedin, and Invercargill—and inspect all fruit, plants, and bulbs imported into the Dominion. They also inspect and issue certificates for fruit, plants, vegetables, &c., exported from these ports. A systematic inspection of fruit and vegetables offered for sale in shops and auction-rooms is also carried out.

The Apiary Instructors are stationed in the main commercial beekeeping districts. They inspect apiaries for disease, and afford advice on all phases connected with beekeeping.

The grading of all honey for export comes within the duties of the Senior Apiary Instructor.

Affording advice and instruction on fruit and vegetable production; the control of orchard diseases and pests; orchard management, including the pruning, spraying, grading, and packing of fruit; orchard shelter and hedges; the preserving of fruit and vegetables; grape-growing outdoor and under glass; the control of vine diseases; tobacco-culture and curing; hop-culture; beekeeping and production of honey for market. The Division carries out the inspection of orchards, vineyards, gardens and nurseries, and administers the regulations relating to the export and import of fruit, plants, &c., and the sale of New-Zealand-grown fruit on the local markets. It also conducts experiments in regard to fruit-trees, manures, spray specifics, stocks, frost control, and fruit cool storage, and is responsible for the control of Te Kauwhata Horticultural Station.

Other functions of the Division include the control of fireblight disease and setting-up of Fireblight Committees, the registration of commercial orchards and nurseries, the collection of orchard and fireblight taxes, inspection of apiaries, registration of apiaries, and the grading of honey for export.

The total area of commercial orchards in the Dominion is approximately 27,000 acres. Registered orchards total 6,203, comprising 2,741 taxable and 3,462 non-taxable. The Division collects the orchard-tax, which last year amounted to £2,266, inclusive of penalty for late payment. Citrus-growing has increased from 495 acres in 1921 to approximately 2,000 acres at the present time.

The cultivation of tobacco was taken up by the Department several years ago, and from 300 acres planted in 1924 the area under this product has increased to approximately 3,800 acres in 1937.

The growing of grapes, both under glass and outdoors, has made steady headway, and new varieties of grapes have been introduced during recent years, several of which promise to be of considerable value. At the Te Kauwhata Station, situated in the Waikato, the growing of grapes for winemaking is carried out, and a considerable demand exists for the wines produced at the Station.

Orchard research work has been receiving the attention of the Division for several years past in co-operation with the officers attached to the Department of Scientific and Industrial Research. This has resulted in much valuable information being obtained, especially in regard to disease control, which has proved of considerable economic value to fruitgrowers. The operations in question cover the testing-out of spraying specifics and other materials for the control of diseases and insect pests; orchard manurial experiments; root-stock tests which include pip, stone, and citrus.

A large amount of experimental work has also been conducted in connection with the cool storage of fruit, both in regard to shipments forwarded overseas and in the cool stores in the Dominion, and some valuable results have been obtained.

The systematic examination of all nursery stock grown for sale in New Zealand has resulted in growers being able to purchase clean, healthy stock—a matter of vital importance in the establishing of orchards. There are some six hundred nurseries registered at the present time.

The satisfactory marketing of fruit, both overseas and locally, is a matter that has involved a great deal of work. A standardized scheme for the sale of apples and pears on the local markets is at present being completed in conjunction with the Internal Marketing Department.

Frost and hail visitations, which have unfortunately been of frequent occurrence in certain districts during the past three or four years, resulted in numerous applications for assistance from fruit-growers in the affected areas, which had to be investigated by officers of the Division.

The beekeeping industry, more especially in regard to the marketing of honey, is also receiving attention. There are now some 7,500 registered beekeepers, representing a total of approximately 125,600 colonies of bees.

Financial Aid through the Department.

IT is questionable whether the primary producers of the Dominion fully appreciate the extent to which financial assistance is afforded to the farming community by the Government through the Department of Agriculture. A few facts and figures may therefore be illuminating, and the occasion of the publication of this issue of the *Journal* would appear to be an opportune and fitting time to briefly outline the activities of the Department from this aspect.

Parliament has appropriated a sum exceeding £1,000,000 for the current financial year as the gross expenditure for vote, Agriculture — an amount well in excess of any previous allocation. Allowing for credits of upwards of £209,000 that it is expected will be received as a set-off against this expenditure and the fact that some £52,000 or

more will be received into the Consolidated Fund from sources arising out of the activities of the Department, but by which the gross expenditure mentioned above is not reduced, there still remains an appropriation in excess of previous figures.

To obtain a clearer conception of the necessity for this relatively large expenditure one must visualize a staff of more than nine hundred officers, most of whom are field officers wholly or partly in personal contact with the farming community, all doing their utmost to improve that part of the industry for which each officer has been appointed to act as guide, philosopher, and friend. Naturally, service in this direction calls for considerable travelling, and travelling means expense, hence there is a comparatively large amount required each year under this item.

The appropriations for expenditure from the Consolidated Fund for the purpose of the Department's requirements are divided into three separate headings — (1) Administrative services; (2) payments under statutes; (3) miscellaneous services. The first covers what might be termed the working-expenses of the department; the second, payments which Parliament, through various Acts, have provided should be paid; and, third, such expenditure arising out of grants, subsidies, guarantees, and special payments that does not come within the normal working-expenses of the Department.

Under the heading of (1) the expenditure takes the form of the cost of personal service to individual farmers and groups of farmers whether dairy, sheep, cattle, orchardists, apiarists, poultry, or other classes of farming, and the bulk of this, therefore, is in the nature of salaries, travelling-expenses, and equipment to carry out the duties to be performed.

Under heading (2) the expenditure is governed by sections of the Stock Act and Slaughtering and Inspection Act, in the direction of compensating owners for the condemnation of stock, and is expected this year to account for over £47,000. Subsidies to Rabbit Boards, based in accordance with the Rabbit Nuisance Act, will absorb £28,000, and assistance to Massey and Canterbury Agricultural Colleges will, by an Act passed in the session of 1937, call for an annual expenditure of at least £27,000.

Assistance in the matter of grants, subsidies, &c., will account for over £550,000 this year under heading (3), the main items of expenditure being assistance to fruitgrowers, for which £67,000 has been provided, and eradication of noxious weeds (mainly ragwort), £74,725, in addition to which a subsidy of £9 6s. 8d. per ton (equal to 1d. per pound) is paid to importers of sodium chlorate and "Atlacide" on sales made of these commodities, and this is expected to absorb £12,000 this year. The effect of this subsidy is to make these weed-killers available to the users at a lower price than otherwise would be the case. Sodium chlorate, before the introduction of this subsidy, was costing the user anything up to £60 per ton, but is now obtainable at varying prices according to the district at probably not more than £35 per ton.

Assistance by way of carriage of lime, fertilizers, and certain farm products on the New Zealand railways included under this heading will account for an expenditure of upwards of £373,000 (lime, £111,000; fertilizers, £101,000; farm products, £61,000). Lime is carried on the New Zealand railways free of charge to the *bona fide* farmer a distance of 100 miles, provided the minimum load is 6 tons. The question of some adjustment in this arrangement, with a view to assistance being given for the carriage of lime to outlying districts served other than through the medium of New Zealand railways, is at present being gone into. There are many factors in this proposed extension, however, which will be difficult to overcome in order to make it a reasonably workable proposition. In the case of fertilizers, the Department bears 40 per cent. of the freight-rate payable under the scale of charges laid down by the New Zealand railways for the carriage of this class of goods. With regard to farm products, the Department bears 12½ per cent. of the freight-rate payable on certain farm products under the scale of charges of the New Zealand Railways for the carriage of this class of goods.

The foregoing are the main items by which direct and indirect assistance is afforded to the farming community by the Department, but there is also a considerable amount of expenditure in the research work that is being carried on at the Veterinary and Dairy Laboratory at Wallaceville, the Chemical Laboratory at Wellington, and the various departmental farms and other subsidized experimental and demonstrational farms throughout the Dominion all of which is assistance in which the farming community benefits The expenditure connected with the Department's activities relative to seed-testing, certification of seeds, experiments relative to field crops and pastures, are further sources of indirect assistance.

Space will not permit of many of the Department's activities being elaborated in full, but some reference must be made to the statistical and investigational side. The work connected with the collection of and the assembling of data relative to the investigations into the costs of dairy-farmers for submission to the committee authorized by Act to report to the Government with regard to guaranteed prices for dairy-produce was delegated to the Department. Investigations into the cost of producing tobacco, lime production (in conjunction with Department of Industries and Commerce), and other factors connected with the distribution of lime, investigation into the costs of producing milk in Manawatu district for human consumption, investigation into costs of meat-export works (in conjunction with the New Zealand Meat Board) are at present under action, all of them required urgently. Many other investigations and surveys asked for from time to time are in train which have as their object the question of what assistance, if any, should be afforded to the primary producers of the Dominion in the spheres under investigation. Again, naturally, this work calls for expenditure which, though the assistance may be thought by the individual farmer as being indirect so far as he is concerned, is certainly direct so far as the Department is concerned, and there can be little doubt that in many instances the results have a far-reaching and beneficial effect on the industry as a whole.

The nature of the soil the farmer tills is of great importance to him. It can be said to influence the whole scheme of his operations, and it has been stated that it is just in so far as he can adapt his plans to suit the general physical condition of his soil that the farmer is successful. A close study of soil peculiarities should be made and crops suitable to the soil and situations grown. Farmers should not have any difficulty in determining which is a light and which is a heavy soil, but where care and knowledge is most required is in working them to the best advantage in so far as crop-production is concerned.

The application of artificial fertilizers is a direct benefit and an important factor in the fertility of the soil, but applications of fertilizers alone will not ensure satisfactory soil conditions. It has been a common error to take it for granted that when a soil is not responding well and crops are poor that all that is required is an increase in the amount of fertilizers used. Drainage, liming, organic matter, and adequate cultivation are foundations on which economically sound artificial fertilizer expenditure must be based.

Importance of Cobalt.

Relationship to the Health of Farm Animals.

C. S. M. HOPKIRK, Officer in Charge of Veterinary Laboratory, and R. E. R. GRIMMETT, Chief Agricultural Chemist.

INVESTIGATIONS carried out during the past three years by a number of workers both in Australia and New Zealand have demonstrated the profound importance to the health of live-stock, particularly ruminants, of a minute quantity of cobalt in the diet.

" Coast disease " and " Enzootic marasmus " in Australia, and " Bush sickness," " Morton Mains Disease," and " Mairoa Disease " in New Zealand, are all associated with deficiency of this element in the pastures, and are curable, partially or entirely, when it is supplied.

That the control of bush sickness in New Zealand by the use of limonite in the form of lick has become a widely adopted and economical measure is to be credited largely to the investigations carried out over a number of years by Mr. B. C. Aston, late Chief Chemist of the Department. Although the discovery that the curative or preventive action is due primarily to the small amount of cobalt and perhaps secondarily to nickel and other " trace elements " contained in the limonite, and not to the main constituent, iron, has disproved the " iron deficiency " theory, nevertheless the analytical and observational data on which that theory was based still stand and form a valuable foundation for later advances.

Many of the investigations now proceeding are still in the initial stages, yet such is their practical importance, and so wide is the interest that has been aroused, that it is considered desirable to outline the present state of knowledge and to make certain recommendations* as to farming practice which may confidently be expected to prove beneficial over a wide area. These recommendations have especial reference to the North Island; in the South Island investigations are principally being conducted by the Cawthron Institute and the Department of Scientific and Industrial Research.

Cobalt in the Animal Economy.

The exact physiological function of cobalt is unknown, but it is apparently essential to animal health, and plays some part in the formation of blood. Without it iron and copper, though they may be in abundant supply, are unutilized. The skin suffers and hair or wool becomes harsh. This is important to the sheep-farmer, as the fleece is of poor quality and shows a break coinciding with the onset of sickness. Milk-yield is adversely affected, possibly through the animal losing appetite and failing to utilize the abundant and otherwise good-quality pastures upon which it is grazing.

It has been shown that as little as 1 mg. of cobalt per week may suffice to keep a sheep in health, but even this small amount is not supplied by many pastures.

Cobalt Status of North Island Pastures.

The investigations of Askew, Dixon, Maunsell, and their co-workers at the Cawthron Institute have shown that certain South Island unhealthy pastures contain (at Glenhope) 0·03 to 0·07 (one apparently exceptional figure of 0·25 is recorded) parts per million.

Analyses of a considerable number of pasture samples, carefully collected to secure the minimum of soil contamination, representative of various sick, border-line, and healthy areas in the North Island, carried out in the Chemical Laboratory of the Department of Agriculture, show that the worst cattle (and sheep) sick pastures, such as occur near Rotorua, contain only about 0·01 p.p.m. cobalt. Other areas where some cattle sickness occurs contain up to about 0·04 p.p.m. of cobalt, while pastures on which cattle are fairly healthy (but sheep become sick) usually contain from 0·04 to 0·07 p.p.m. of cobalt. Above this level there is usually little trouble, though the influence of seasonal variation and other factors, such as pasture species, remain to be ascertained.

Pastures in healthy areas usually contain from 0·07 to 0·3 p.p.m. of cobalt, although much higher figures may be found to occur when more numerous analyses are completed.

A summary of the position, so far as results at present allow, based on the distribution of soil types (mainly volcanic ash showers) and on incidence of sickness is as follows* :—

	Number of Samples.	Co p.p.m.		
		Lowest.	Highest.	Average.
Pastures from bush-sick areas—				
Taupo Shower	22	0·01	0·06	0·035
Kaharoa Shower	7	0·02	0·05	0·03
Mairoa Shower	10	0·02	0·05	0·03
North Auckland (similar to Mairoa)	3	0·03	0·05	0·04
Waikato	6	0·04	0·05	0·045
Poverty Bay – East Cape – back country	23	0·02	0·14	0·05
Pastures from healthy areas—				
Tarawera Shower (healthy)	2	0·06	0·09	0·08
Auckland District	7	0·06	0·15	0·09
Taranaki	4	0·03	0·15	0·08
Manawatu	3	0·10	0·17	0·14
Poverty Bay (healthy)	3	0·15	0·19	0·17
Hawke's Bay	2	0·10	0·15	0·13
Wairarapa	8	0·04	0·25	0·11
Wellington	4	0·05	0·10	0·08
Canterbury (basalt)	2	0·10	0·25	0·18

* The recommendations have been approved by the Cobalt Committee, which consists of representatives of all those chiefly concerned with cobalt investigations, including the Department of Scientific and Industrial Research, the Cawthron Institute, and the Department of Agriculture.

* The detailed figures will be published later in an article by Mr. K. J. McNaught, who has carried out the analyses.

From the point of view of incidence of bush sickness, the North Island may be divided into a number of zones. The zone of maximum severity is situated on the high country to the north-west of Lake Rotorua, the topsoil consisting of coarse pumice ash of the Kaharoa type. On this area sheep-farming was formerly considered impossible, and cattle had to be changed once or twice a year to healthy country.

Nearly equal in severity is the vast expanse of country covered by pumice of the Taupo Shower, extending over the Patetere (Mamaku) Plateau from near Rotorua to Lichfield, across to the high country east of Te Awamutu and Te Kuiti, thence nearly to Wairoa and the Gisborne back country and through again to Rotorua. Much of this country is not farmed, and the severity of sickness generally decreases from higher to lower levels. In some parts neither cattle nor sheep can be kept permanently; in others sheep sicken, but cattle remain healthy. Portion of this area to the east of Rotorua is healthy as a result of the recent covering of Rotomahana mud and Tarawera ash.

On the outskirts of the Taupo ash are zones or scattered areas where the soil is formed from older volcanic ash deposits. On these, as at Mairoa, near Putaruru, and in parts of northern Hawke's Bay and the back country of Poverty Bay, cattle may be bred and remain healthy, and mature sheep maintain tolerable condition, but it is often difficult to rear lambs. Hogget-mortality may occur to the extent of 25 or 50 per cent. and though intestinal parasites may be numerous their removal by drenching does not cure the condition.

It is probable that beyond these zones others occur where definite symptoms of sickness or unthriftiness may not be apparent or are only discernible to the trained eye, but where sheep do not thrive as in "really good sheep country." Tentative data suggest that much of the Waikato, many parts of North Auckland, and areas in the King-country, Hawke's Bay, and East Cape districts, are of this nature.

The degree of sickness or healthiness in country of the last two categories is largely dependent on topographical and farm-management conditions. For example, much of the hill country to the west and north of Poverty Bay consists of an underlying or country formation of mudstone (papa) and sandstone. This has been dissected by erosion to varying degrees—in places nearly level sandstone forms gently undulating surfaces or caps the hills; in others the slopes are steep and the faces continually slipping or slumping. Ancient showers of pumice ash probably from Taupo* and in parts the recent Taupo shower have spread over the whole of this area. On the gentler and more stable slopes the pumice ash remains, and when the pasture it supports is grazed continually the health of stock, especially sheep, suffers. On the steeper slopes, especially on mudstone faces, slipping has resulted in mixing of the soil with underlying mudstone, and a soil healthy for stock has resulted. Analyses show the pasture from this type of soil to be higher in cobalt than that from the gentle pumice slopes.

Where plenty of cattle are carried they clean out the second growth and rank grass on the steep faces and in the gullies, enabling sheep to gain access to those parts of the pasture richest in cobalt. Thus sheep on the whole area of a farm may be healthy, following good stock control; the sheep are able to obtain their own "change" pasture.

* Private communication from Director of Soil Survey.

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Where growth is uncontrolled through insufficient cattle being carried, the choking of gullies and steep faces results in the sheep being forced on to the drier and finer pasture of the flat tops and gentler slopes, where the cobalt deficient ash is thickest. Under these conditions sheep ailment is much intensified.

The Use of Limonite.

Following the discovery that the efficacy of limonite could largely be correlated with its cobalt content, constant endeavours have been made to maintain this content at as high a figure as possible in the supplies of commercial limonite available to the farmer. Surveys have been made of the cobalt content of ore from the various portions of the quarries, and the companies have, so far as practicable, quarried those portions from which the richest samples have been obtained.

It has been found that the ore varies in cobalt content from a few parts to over 300 p.p.m. in neighbouring masses and although colour is sometimes (probably fortuitously) a guide, it is not reliable. So long as the finely ground limonite contains over 50 p.p.m. cobalt it appears to be satisfactory for lick purposes, but it is considered desirable that the average should be nearer 100 p.p.m. Considerable variation in the commercial product, however, still exists, and several recent samples have contained in the vicinity of only 10 to 15 p.p.m.

So that no avoidable losses may occur farmers are to be encouraged to submit samples of commercial limonite supplies which they have purchased to the Chief Agricultural Chemist, Chemistry Section, Department of Agriculture, Wellington, for analysis. Samples should be of 1 lb. to 2 lb. weight and taken so as to be representative of the whole consignment.

In order that farmers, who as the result of experience have made the use of limonite lick part of their farming practice, may not suffer from any unevenness in the cobalt content, the Department is arranging for a supply of a strongly cobaltized and coloured salt to be held by district officers for sale to farmers. When mixed with agricultural salt according to directions the resulting product will contain about 23 p.p.m. of cobalt in water-soluble form. The mixing of this with equal parts of limonite will enhance the cobalt content of the final lick by 11 p.p.m. or 12 p.p.m. Considering its entirely water-soluble condition, this will probably at least be equal to average good limonite. Any additional virtues that the use of limonite may possess will thus still be available to the farmer.

It is probable, however, that a cobaltized agricultural salt will eventually be placed on the market, and negotiations are in train at present with the importers and manufacturers to this end. No doubt many farmers will try the cobaltized salt as a lick without the addition of limonite.

Several experiments under departmental control or observation on the use of limonite as a top-dressing are at present in progress. The results so far are indefinite, but there are no indications that this method would offer advantage over the use of limonite as a lick, and even if partially successful it would probably be displaced by the much more certain method of applying a water soluble cobalt salt in the ordinary top-dressing.

Experiments with Cobalt Top-dressing.

Following the demonstration by the Cawthron Institute that cobalt applied as a top-dressing is readily assimilated by the pasture, a number of experiments have been laid down in the bush-sick and border-line districts and are under control or observation by local officers of the Department. Regular samplings of the untreated and treated pasture are being carried out, and data already available indicates that great improvement in cobalt content of the pastures and in the health of the stock follow the application of as little as ½ lb. or even a ¼ lb. of cobalt chloride per acre. An account of these experiments will be published at a later date.

Organization of Experimental Work.

The scope of experimental work being carried out by the Department of Agriculture in the North Island includes a general survey of the cobalt status of sick, border-line, and healthy pastures, the determination of seasonal variation in cobalt content of selected representative pastures in different districts, drenching and lick trials with cull sheep or "poor doing" hoggets as a diagnostic measure in areas where there is doubt as to whether the poor condition or losses of stock are due to cobalt deficiency, and cobalt top-dressing experiments in areas where it is definitely determined or suspected that cobalt deficiency occurs. In addition to the field experiments, Dr. I. J. Cunningham, at the Veterinary Laboratory, is undertaking experimental work with rats in an attempt to gain knowledge of the function of cobalt in the animal system, and Mr. S. W. Josland is investigating the blood-changes induced by cobalt deficiency.

The experiments are under the general direction of the authors and the District Superintendents at Auckland and Wellington, and the local charge of the Veterinarians at Hamilton (Mr. T. A. Blake), Gisborne (Mr. P. Haugh), and Whangarei (Mr. T. H. Hankin), comprising respectively the Bay of Plenty, King-country and Waikato, Poverty Bay back country, and North Auckland, and the Fields Division is co-operating especially in making available the services of Mr. C. R. Taylor, Fields Instructor, Whakatane, who has had much experience in lick-feeding experiments and the collection of pasture samples. It is anticipated that later articles by these officers will present in greater detail the results of investigations in their districts.

Preparation of Cobalt Salts.

The strongly cobaltized salt previously mentioned will be prepared by mixing 4 oz. of cobalt sulphate with 18¾ lb. of fine salt and 1 lb. of hæmatite, which will colour it a distinctive red. It will be sold in 5 lb. packets, and is intended to be mixed at the rate of 1 lb. to 1 cwt. of agricultural salt. The bright-red

H. M. Besley's Lick-box. Oblique Front View.

colour will enable the farmer to judge when the product is evenly mixed. If intended for use with limonite the cobaltized salt should first be mixed with agricultural salt and this then mixed with the limonite. Limonite of high cobalt content or cobaltized salt with or without limonite should be used by all farmers in the North Island who are located within the areas mentioned in this article unless stock health and production is already fully satisfactory. A special lick-box which is now much used was described in the *Journal of Agriculture* for April, 1932. One lick-box to 50 acres of sheep country is not excessive, and the lick should be put out in small quantities and replaced frequently.

For use as a drench, supplies of cobalt sulphate will be available in 1 oz. bottles. This ounce is to be dissolved in 1 pint of water, carefully bottled and corked, and kept as a stock solution. As required, 1 fluid ounce of stock solution is mixed with 1 gallon of water, and 1 fluid ounce of this dilute solution forms the dose for sheep. It contains 1·9 mg. of cobalt; should cobalt chloride be used the dose will contain 2·2 mg. cobalt, but the slight variation is immaterial. As a preventive measure, or when sheep show signs of going off but are not in a critical condition, and it is decided to drench them, this should be carried out weekly until recovery is established. Where the condition of the sheep is critical the same dose may be given at more frequent intervals—say, three times a week—until improvement is noticeable, after which drenching may be continued at weekly intervals.

Summary.

Investigations both in Australia and New Zealand have shown that a number of stock ailments of the general type known as "bush sickness" are due to a deficiency of cobalt, and not as formerly thought to a deficiency of iron.

Practical control of bush sickness both in cattle and sheep has been achieved as the result of supplying limonite containing cobalt as a lick.

Analyses of a number of representative North Island pastures show that the varying degrees of incidence of bush sickness are correlated with the cobalt content of the pastures. Where sheep are affected the cobalt content appears to vary from 0·01 to 0·04; where cattle but not sheep are affected the cobalt content appears to lie between 0·04 and 0·07. Healthy pastures contain usually above 0·07 p.p.m.

The zones of incidence of bush sickness are outlined and the influence of topography and stock-management discussed.

It is shown that the deposits of limonite are so variable in cobalt content that no guarantee can be given in respect to any consignment without an analysis being undertaken. To avoid the possibility of loss of stock through the use of limonite of insufficient cobalt content farmers are advised to use cobaltized salt in making up the lick.

An outline is given of experimental work in progress in the North Island.

Supplies of a strongly cobaltized salt for the preparation of licks, and of cobalt for drenching purposes, are to be made available for sale by local officers of the Department to farmers.

Recommendations are made as to the methods to be followed in the use of cobalt.

Sale of Cobalt and Cobaltized Salt.

As from the 1st February, 1938, supplies of cobalt sulphate and of a strongly cobaltized salt will be on sale from the District Offices of the Department of Agriculture at Auckland, Hamilton, Whangarei, Rotorua, Te Kuiti, Tauranga, Opotiki, Gisborne, and Hastings. The cobalt sulphate will be put up in 1 oz. bottles and sold at 1s. per bottle. Postage, 1d. extra. The cobaltized salt will be coloured a distinctive red, and sold in 5 lb. bags at the price of 2s. per bag. Postage, 1s. extra.

The cobalt sulphate is intended to be used for drenching sheep that are falling away in condition and when it is suspected that bush sickness—"cobalt deficiency"—is the cause of the trouble. The 1 oz. is to be dissolved in 1 pint of water, which is to be bottled and kept as a stock solution. One fluid ounce of this stock solution is to be added to one gallon of water for preparing the drenching solution as required from time to time. Of this drenching solution, 1 fluid ounce forms the dose per sheep and may be given at weekly intervals or more often—say, three times weekly, if desired—until improvement is marked.

The cobaltized, red-coloured, salt is intended for mixing at the rate of 1 lb. per hundredweight of agricultural salt—*i.e.*, 5 lb. bag to be mixed with 5 cwt. of agricultural salt. To prepare a cobaltized salt lick this may be used as a lick by itself or further mixed with equal parts of limonite, and should be made available to all stock in the areas mentioned in the preceding article as a preventive measure against unthriftiness due to cobalt deficiency. The lick should be put out frequently in small lots, and the lick-box in the accompanying photograph will be found useful for the purpose. One box to 50 acres may be suggested as a reasonable rate of distribution in hilly sheep-country.

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Vaccination of Ewes against "Pulpy Kidney."

Trials in Otago and Southland, Season 1937.

C. V. DAVUS, M.R.C.V.S., District Superintendent, Dunedin.

IN the February, 1937, and May, 1936, issues of the *New Zealand Journal of Agriculture* details were given of experimental trials with an enterotoxæmia vaccine (prepared from clostridium welchii, Type D), and the technique for vaccination of the ewes was explained.

In these trials the results were sufficiently encouraging to warrant the Department taking the necessary steps to facilitate the supply of vaccine to enable those farmers who wished to do so to vaccinate their own ewes, in order to minimize the losses from "pulpy kidney" in lambs.

The vaccine was prepared by the Commonwealth Serum Laboratories, Parkville, Victoria, and supplied in New Zealand from the Veterinary Laboratory, Wallaceville, Wellington. The amount of vaccine obtained was 750,000 c.c., enough to do 50,000 ewes, and, as it turned out, if more had been available it could have been utilized. Of this quantity, 409,450 c.c., or enough to vaccinate 27,296 ewes, was obtained by farmers for use in Otago and Southland.

It is my purpose to briefly summarize the results of the season's experience in this district, though there are certain obvious difficulties in regard to an absolutely accurate estimation of the value of such a prophylactic vaccine when used more or less extensively under practical conditions.

The vaccine was used on fifty different farms in the Dunedin District, and the details are shown in the following table:—

Table I.

District.	Farms.	Number of Ewes vaccinated.	Lambs lost: Presumed "Pulpy Kidney."	Percentage Loss calculated on Lambing Percentage.
Ranfurly ..	8	4,936	43	0·89
Pembroke ..	7	3,090	7	0·19
Oamaru	6	4,144	55	1·18
Dunedin ..	17	7,814	170	2·03
Balclutha ..	5	1,990	8	0·37
Southland ..	8	3,440	18	0·5
Totals ..	50	25,414	301	..

Ranfurly.—The approximate average annual loss in the district on the farms concerned in the past has been in the vicinity of 4 per cent. This year on nine neighbouring farms where the vaccine was not used the loss varied—0·7 per cent., 1·25 per cent., 1·6 per cent. (two), 1·9 per cent., 3 per cent., 3·23 per cent., 3.3 per cent., and 5 per cent.

Pembroke.—The approximate average annual loss in the past on the farms concerned in this district has also been in the vicinity of 4 per cent. This year on eleven neighbouring farms where the vaccine was not used the loss varied—2 per cent (two), 2½ per cent. (five), 3 per cent., 3½ per cent., 5 per cent., and 6 per cent.

Oamaru.—The approximate average annual loss in the past five years on the farms concerned in this district has been up to 5 per cent. This year on thirteen neighbouring farms where the vaccine was not used the loss varied—2 per cent., 2½ per cent. (two), 3 per cent. (five), 3½ per cent., 4 per cent. (two), and 5 per cent. (two).

Dunedin.—This includes the Taieri and Strath Taieri districts, and the approximate average annual loss in the past five years on the farms concerned has been over 5 per cent. This year on fourteen neighbouring farms where the vaccine was not used the loss varied—Nil (two), 0·9 per cent., 1·1 per cent., 1·2 per cent., 1·4 per cent., 2·5 per cent., 3·8 per cent., 4 per cent., 4·8 per cent., 6·1 per cent., 6·7 per cent., 6·9 per cent., and 7·7 per cent. The higher loss of 2·03 per cent. in the vaccinated group is accounted for by the experience on three farms.

Balclutha.—The approximate average annual loss in the past five years on the farms concerned in this district has been between 4 per cent. and 5 per cent. This year on ten adjoining farms where the vaccine was not used the loss varied—1 per cent. (five), 2 per cent., 2·5 per cent. (two), 2·6 per cent., and 2·75 per cent.

Southland.—This includes Lumsden, Gore, Otautau, and Wyndham districts. The approximate average annual loss in the past five years on the farms concerned in this district has been in the vicinity of 5 per cent. This year on eighteen neighbouring farms where the vaccine was not used the loss varied—Nil (three), 0·52 per cent., 0·75 per cent. (two), 0·88 per cent. (two), 0·9 per cent. (three), 1·09 per cent., 1·2 per cent., 1·37 per cent., 1·58 per cent., 1·9 per cent., 2·25 per cent., and 4·54 per cent.

Fewer Losses.

From the information given above it will be noted that the percentage loss of lambs from the vaccinated ewes varied in the different districts, but in general the figure is below that experienced on the same farm in previous years and also below that of several neighbouring farms in the same district during the 1937 season. With few exceptions this position holds good for the fifty individual farms, the full details of which are rather too cumbersome to include at this stage.

Although the technique of vaccination was fully described, instructions issued with each order of vaccine, and wherever possible demonstrations given, it was only to be expected that in the first year some farmers would experience difficulty in accurately carrying out the procedure. In future, however, one can anticipate improvement in this respect, especially in the case of those who now have previous experience. It is important that each ewe receives the two doses of vaccine exactly as prescribed. From one or two observations, where losses have been rather higher than expected, when it was only possible to give the first dose of vaccine, it is essential to use the double method of vaccination—that is, 5 c.c. approximately six weeks before lambing, and the second dose of 10 c.c. as near to lambing as is practicable.

The confirmation of the cause of death of the lambs lost provides another source of error. The figures shown give the cause of death as "pulpy kidney"; this in the majority of cases has necessarily to be determined by the farmer himself. There is no doubt that in some instances, at least, deaths will have been recorded which were definitely not due to "pulpy kidney."

Several farmers used the vaccine on a portion of the flock, and the following table shows the comparative results on the same farms in these cases :—

Still a further cause of error has been the difficulty, where unvaccinated ewes have been depastured with vaccinated ewes, of always being sure of the identity of the lamb lost. This difficulty will be eliminated by the vaccination of all ewes on the property, and this no doubt will be done in more cases in future, following the initial experience of this season's work.

Table II.

Vaccinated Group.			Unvaccinated Group.		
Number of Lambs.	Number of Lambs lost from "Pulpy Kidney."	Percentage Loss from "Pulpy Kidney."	Number of Lambs.	Number of Lambs lost from "Pulpy Kidney."	Percentage Loss from "Pulpy Kidney."
524	0	Nil	900	30	3·3
320	12	3·75	150	13	8·6
262	1	0·38	712	25	3·5
156	1	0·63	1,407	10	0·7
525	2	0·38	423	10	2·36
780	1	0·12	400	15	3·75
435	0	Nil	82	3	3·65
575	2	0·34	1,167	25	2·14
325	0	Nil	275	10	3·63
632	2	0·31	682	12	1·75
316	0	Nil	1,903	32	1·68
770	11	1·42	1,738	28	1·61
212	1	0·47	297	7	2·35
2,200	37	1·68	275	9	3·27
250	1	0·4	896	20	2·23
1,150	17	1·47	168	9	5·35
163	4	2·46	10	4	40
556	8	1·43	1,114	32	2·87
269	14	5·18	171	8	4·67
165	0	Nil	510	0	Nil
440	4	0·9	82	5	6
122	0	Nil	63	10	15·86
240	1	0·41	1,300	8	0·61
217	0	Nil	1,043	4	0·38
11,604	119	1·025	15,768	329	2·086

Beneficial Results.

The experiences of the 1937 season in Otago and Southland, where the vaccine has been used by farmers themselves on a more extensive scale than was formerly possible, have supported the results obtained in the earlier experimental work previously recorded.

It was not claimed then that the loss from "pulpy kidney" in lambs would be entirely eliminated by vaccination of the ewes. The contention was put forward that there was a possibility of reducing the mortality, and this has been the case in the more extended trials under practical farming-conditions.

In the majority of cases mortality has been very considerably reduced, thus making vaccination a practical and economic consideration.

It seems evident that many more sheep-farmers will carry out the vaccination of their ewes next season. The vaccine is being stocked as before at the Veterinary Laboratory, Wallaceville, Wellington.

Canterbury Report.

The following report on the position in Canterbury has been received from Mr. W. D. Blair, District Superintendent :—

FIG. 1.—Filling the Race preparatory to Vaccination.

FIG. 2.—The Site of Injection exposed, showing the Angle of the Syringe when introducing the Needle.

The incidence of enterotoxæmia amongst lambs in Canterbury during the past season has been very low—in fact, in some districts practically no cases were reported or came under notice of the Departmental officers. It can safely be said that this year's incidence was the lowest for a number of years, and this fact makes it difficult to assess with any degree of accuracy the efficacy or otherwise of the vaccine.

This season saw the start of vaccination in Canterbury, and when it is recognized that some 300,000 c.c. of the vaccine was purchased it shows, I think, the desire of many owners to tackle the trouble on lines which elsewhere have been demonstrated as sound. Next season a greater demand for the vaccine can be anticipated, as no doubt many owners held off in order to see results in their neighbours' flocks which were vaccinated. In all, forty owners used the vaccine and a questionnaire was sent to each. To date I am in receipt of twenty-six replies. Percentages worked out in the figures submitted show mortalities in lambs from vaccinated ewes to be 1·21 per cent., as against 2·77 per cent. in those from non-vaccinated ewes.

It should be pointed out, however, that on seventeen properties no controls were held, all ewes were vaccinated, and thus there were only 4,048 controls recorded against 13,145 vaccinated. In one or two instances the vaccinated and non-vaccinated ewes got "boxed," and this made identification impossible when the unvaccinated ewes were unmarked.

This season it can be taken that 3 per cent. would be a fair estimate of losses in lambs in unvaccinated flocks. The average estimated losses in previous years as submitted by owners works out at 8·41 per cent. As stated previously, the incidence was so low that practically no opportunities were afforded officers to investigate mortalities, and thus the information supplied as to number of deaths by the owners could not be verified, and no doubt any lambs dying within the critical period—*i.e.*, from the third to sixth week—were recorded as victims of "pulpy kidney."

Characteristics of Resistance Oat.

Field Experiments in New Zealand.

J. W. HADFIELD, Agronomy Division, Plant Research Bureau, J. M. SMITH and J. W. WOODCOCK, Fields Division, Department of Agriculture.

THE Resistance Oat was bred by Dr. Hunter, of the Cambridge University Plant Breeding Institute. It arose from a cross between Grey Winter, a hardy variety with weak straw, and Argentine, a variety characterized by its resistance to lodging. The resultant selection "Resistance" has inherited winter hardiness from the one parent and resistance to lodging from the other, and these are associated with a capacity for very high yield of both grain and sheaf. It is therefore "resistant" to winter killing and lodging.

Growth Characteristics.

The early growth of Resistance is semi-erect. Its winter production is not as great as that of Algerian, but during the spring it grows rapidly and may outstrip Algerian. When grazed with sheep it has proved to be as palatable as Algerian and Abundance. The straw is fine, clean, erect, and about 6 in. shorter than Abundance. Each plant produces a large number of panicles, resulting in a very dense crop. In regard to maturity, it is about seven days later than Abundance. It is as susceptible to rust as Abundance, although except in the North Island rust has not been severe enough to cause any loss in the trials so far conducted.

Type of Grain.

The grain is pale yellow in colour, and, as might be expected in a variety which produces such a high proportion of fertile tillers, it lacks uniformity in size. Using the same screens as for Abundance, dressing returns show a high percentage of seconds, which are, nevertheless, very plump. Without fairly heavy screening there would, no doubt, be experienced some difficulty in passing Resistance as A grade. This is further emphasized by a consideration of the bushel weight, which is comparatively low. Thus in 1936–37 Resistance weighed 40·5 lb. per bushel, and Abundance 44 lb. per bushel. The proportion of husk during the same season proved to be 29·5 per cent., as against 28·4 per cent. for Abundance.

Experiments with Resistance Oat.

The variety was first received in New Zealand in 1934 by the late Mr. C. H. Hewlett, direct from Dr. Hunter, as an unnamed cross, and passed over to the Agronomy Division for trial.

During the 1934–35 season it was autumn-sown at the Ruakura Farm and at Lincoln. Under North Island conditions the yield was not promising, recovery after cutting poor, and leaf-rust infection very severe. At Lincoln, however, the variety showed distinct promise, as the sheaf-weights proved to be 45 per cent. greater and the grain yield 23 per cent. greater than Algerian.

One bushel was imported in 1935, and samples autumn sown at Palmerston North and again at Lincoln. Under North Island conditions it behaved as it had the previous season. The yield was poor, and leaf-rust infection severe.

At Lincoln it yielded 13·5 per cent. higher in sheaf-weight than Algerian, but was not superior in grain-yield, nor in green-feed as measured by the late winter and early spring growth. Part of the trial was, however, cut back to represent grazing, and the subsequent recovery, measured as grain-yield and sheaf-yield, was 40 per cent. above Algerian. The inference, therefore, was that Resistance could stand grazing better than Algerian.

The balance of the imported seed, approximately 1 bushel, was sown thinly on 1 acre at Lincoln, and from this area 100 bushels were harvested.

Field Trials, 1936–37.

The results of the two previous seasons were such as to warrant more extensive trials, and seed was therefore passed over in the Fields Division for this purpose. The results of these trials in which Resistance was compared with several other varieties, are recorded below.

1. *Experiment on Farm of Rangiora High School (sown 19th June, 1936).*

This trial was divided into two parts, one being grazed with sheep during the spring and the other not grazed.

All varieties other than Resistance were cut by hand between 11th January, 1937, and 19th January, 1937, whereas Resistance was not ready for cutting

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Resistance Oat: Single Plant Selections.

until 4th February, 1937. A fair amount of stem-rust was in evidence on the latter.

Yield, in bushels, per acre:—

Variety.	Grazed Section.	Ungrazed Section.
Resistance ..	69·9	94·9
Black Supreme ..	62·5	85·1
College Algerian ..	58·1	75·9

The yield of Resistance was significantly greater than all varieties except Black Supreme on both the grazed and ungrazed sections.

2. *Experiment on Farm of E. Harrison-Wilke, Malvern.*

Date sown: 13th August, 1937. All varieties harvested, 9th February, 1937. Although all varieties were ripe when cut, Resistance was rather later to mature than the others. Straw-break was rather bad in the Resistance plots, and this variety was inclined to tangle.

Yield, in bushels, per acre: Resistance, 46·0; Black Supreme, 33·3; College Algerian, 28·1.

Resistance was significantly better than the remainder.

3. *Experiment on Farm of R. T. Cross, Knapdale.*

Date sown: 22nd October, 1936. Crop harvested, 27th March, 1937. Resistance was reported as being a good heavy headed oat with a fine strong straw.

Yield, in bushels, per acre: Resistance, 89·3; Black Supreme, 74·1; Garton's Abundance, 68·3.

No statistical examination of these yields was made.

4. *Experiment on Farm of Plunkett Bros., South Hillend.*

Date sown: 29th October, 1936. Crop harvested: 28th March, 1937.

Yield, in bushels, per acre: Resistance, 55·2; Black Supreme, 57·6; Garton's Abundance, 47·3. These yields were not examined statistically.

5. *Further Trials at Lincoln.*

To augment the trials conducted by the Fields Division two further experiments were conducted by the Agronomy Division at Lincoln. The first was a replicated trial sown in the autumn with a six-coulter drill using Algerian as a control. Resistance outyielded Algerian by 56 per cent. in grain-yield. The season was abnormally wet and admittedly an unfavourable one for Algerian. The second was a replicated trial hand-sown both in autumn and spring, with Algerian as control. Under autumn sowing Resistance outyielded the control by 50 per cent. in grain-yield, and by 72 per cent. in sheaf-weight. In the spring-sown trial the slight superiority of Resistance was not significant. Indications were, therefore, that in Canterbury Resistance should be sown in the autumn. Compared with the adjoining plots of Garton's Abundance, in the autumn-sown replicates of the same trial Resistance outyielded Abundance by 30 per cent. in sheaf-weight and 26·4 per cent. in grain. Owing to the heavy rainfall lodging was very severe and all varieties succumbed except Resistance, which alone showed no sign of this defect.

A fine Crop of Resistance Oat.

Experience in Otago and Southland.

The oat crop is an important one to Otago and Southland, and of the 290,000 acres grown in New Zealand for chaff and grain 120,000 acres are grown in these two provinces.

The principal variety grown is Gartons, with a certain area of Dun and Algerian. Some three seasons ago the Resistance Oat was introduced, and during the first season it was grown it gave promise of being a variety that would prove suitable to the South and indications that it would be superior to the commercial varieties already in use. During the past two seasons there was a keen demand for the seed of Resistance, and, although the seasons were not favourable ones, this variety fulfilled the promise of the first season in outyielding the ordinary varieties used. During the 1936–37 season the Agronomy Division supplied seed for simple observational trials on eleven farms in Southland, but these were all spring-sown. The season in Southland, and to a lesser extent in Otago, was very wet right throughout the spring, summer, and autumn, but the Resistance Oat cropped very satisfactorily and in most of the trials was the only variety that did not lodge badly. In many cases where the usual varieties were sown the crops were so badly lodged that it was not possible to cut them, but all crops of Resistance Oats, as far as is known, stood up well under very adverse weather conditions.

At Tisbury, in Western Southland, a block of Resistance Oats was sown in the centre of a crop of Garton'sAbundance. The Resistance were shorter in the straw and exceptionally well headed, and the sheaf was like a sheaf of wheat.

In the Mossburn district an area of Resistance was sown alongside a block of Garton's Abundance. Just prior to maturity an inspection of this paddock showed that the Resistance was some 6 in. shorter in the straw, but well headed and standing, whereas the Gartons was badly lodged. This was on heavy land. At Papatotara the Resistance Oat was sown alongside Garton's Abundance on heavy terrace land. As at Mossburn, the Resistance was shorter in the straw by 6 in., but was well headed and standing well, while the Gartons were badly down. Owing to the weather conditions the crop had to stand well after the oats were ripe, and the Resistance straw did not break as did the Garton's Abundance, while there was practically no shaking with the Resistance.

A trial at the Winton Demonstration Farm on medium land and sown very late also proved Resistance superior to Gartons Abundance. In this case the Resistance Oat was shorter in the straw but stood up well, whereas the Gartons

Three Heads of Resistance Oat.

lodged badly, while at Lochiel the Resistance Oat gave a better yield than did Garton's Abundance.

The general indications, therefore, are that the Resistance Oat is likely to prove a popular variety in Otago and Southland, but particularly in Southland. Its susceptibility to rust is not of a great deal of moment in these districts, but its ability to yield heavy crops of grain and also good crops of fine straw, the strength of which enable the crop to stand up well under adverse conditions and on heavy soils of Southland, make it a very suitable variety for the South.

Seed-supply.

The seed stocks raised by the Agronomy Division have been passed over to the Canterbury Agricultural College, Lincoln, for increase. As this area will be entered for certification, it is anticipated that certified seed from the 1937–38 harvest will be available from the Lincoln College.

Summary.

Resistance has the following disadvantages :—

(1) It is too susceptible to leaf-rust for general use in the North Island, and cannot there replace Algerian.

(2) Its maturity is about one week later than Garton's Abundance.

(3) In comparision with Abundance, the grain has a lower bushel-weight and a higher proportion of seconds and of husk.

(4) It is likely to be less popular with merchants than with farmers.

Resistance has the following advantages in the South Island :—

(1) When autumn sown it gives a higher yield of grain and sheaf than either Algerian or Abundance.

(2) It does not lodge even when autumn sown in a wet season and on heavy land.

(3) It may be grazed during the winter and early spring as heavily as, if not more heavily than, Algerian, and the recovery is stronger.

(4) It fills an important requirement in the South Island—namely, a " white " oat that can be autumn sown, grazed heavily, and will not lodge even when not grazed.

Acknowledgments.

The above data were collected from information contributed by Messrs. Calder, Thompson, and Black, of the Agronomy Division, Department of Scientific and Industrial Research, and by Messrs. Stuart, Faithful, Allo, and Arnold, of the Fields Division, Department of Agriculture. The assistance of farmers who co-operated in the field trials is acknowledged.

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The Position of Primary Industries in New Zealand.

E. J. FAWCETT, Technical Liaison Officer.

Historical.

THE pioneer settlers in New Zealand envisaged the country's destiny at a very early stage of their colonization. History indicates that the main urge of the people comprising experimental expeditions was the desire to acquire land and a sense of freedom. It was realized quite rapidly that the size of the Islands, coupled with their surface covering and topography, precluded the country becoming an important self-contained unit, whilst its isolation from densely populated centres determined its limits as an immediate source of food-supply for the millions of Great Britain.

Development was slow in the early stages, and only speeded up when gold was discovered. A few years' working and investigation proved that mineral deposits of an economic nature were limited in extent, and the population was thrown back on to the exploitation of the soil. An equable climate, bright sunshine, adequate and well-distributed rainfall, and soil of reasonable quality represented a combination which enabled settlers to exploit the provisions made by a bountiful nature. Inability to transport perishable goods to distant markets was the stumbling-block. By 1880 the position presented a problem, to which refrigeration supplied the answer. With the markets of the world thrown open, a new and entrancing vista was disclosed, and developments took place fairly rapidly. The ingenuity and desires of man were given full rein, resulting in the destruction of the forest covering and conversion of the stored-up energy of centuries into pasturage of a quality unsurpassed anywhere in the world. Virgin land, sunshine and rain, the ability to pasture stock in large numbers without a laborious provision for winter, all combined to develop an extensive system of farming under natural conditions, resulting, with the assistance of science, in an ever-increasing export of high-grade food products, with wool as a natural adjunct to meat. Although secondary industries of minor importance gradually developed, they have been until recent years mainly of a type naturally associated with the processing of primary products, or for the manufacture of implements of production. Our inability to provide the raw mineral and vegetable products necessary to secondary industries, combined with a small population, inexperience, distance from absorbing markets, and an encumbrance of external debt, have committed us to the production of those goods for which we are most suited and by the exchange of which we could meet our interest liabilities and, in addition, provide for our people the products of manufacturers overseas.

Thus we find that products of the soil have increased in volume by more than 130 per cent. since 1900, this increase being effected by a combination of increase in units of labour plus greater efficiency of labour, this latter factor having improved to the extent of over 50 per cent. in thirty-six years. The main items of this volume of produce represent approximately 3,500,000 sheep, 9,500,000 lambs, 500,000 cattle, 1,000,000 pigs, 440,000,000 pounds of butter-fat, 250,000,000 pounds of wool, 3,000,000 cases of apples, and the skins, hides, and tallow which represent the by-products of our primary industries.

International Trade.

As a result of the emphasis placed on the importance of maintaining output of animal products, the Dominion occupies a most favourable position quantitatively in international trade of meat and dairy products. It is true that Great Britain is the main importer of such commodities, and she has many countries catering for her needs. Great Britain imports between 300,000 tons and 350,000 tons of mutton and lamb annually, of which New Zealand supplies about 50 per cent. We are of very little importance so far as beef is concerned, but of the 610,000 tons of butter entering into international trade we supply about 23 per cent. Great Britain imports about 480,000 tons of butter each year, our proportion amounting to approximately 28 per cent. of the total. So far as cheese is concerned New Zealand supplies about 34 per cent. of the total entering into international trade, and about 66 per cent. of the annual imports of some 140,000 tons required by Great Britain.

Secondary Industries.

It is not to be expected that a small country situated so far from the world's markets and carrying a population of about a million and a half people should rapidly develop secondary industries. It is true that we find industries connected with the processing of primary products have grown up, and certain other undertakings which are economically sound owing to protection afforded by transport or tariff advantages have developed to meet the deeds of consumers locally. In the aggregate the added value represented by such industries amounts to a total placed at £30,000,000 to £45,000,000 annually, but when the total volume of primary and secondary production is computed on a *per capita* basis it is found that the position has not altered materially during the past thirty-six years. As previously noted, volume production of primary commodities has increased per unit of labour. If the number of people represented per head of those employed has remained stationary, this means that with the passing of time, an increasing proportion of our added population are finding a livelihood in channels of employment which are not directly associated with primary or secondary industry as expressed in terms of production. An increasing percentage of our available labour is employed in servicing the requirements of industry and the remainder of the population generally, and the structure of the Dominion's economic life is gradually assuming the complex structure associated with ageing development.

What of the Future?

For some years past it has been apparent that the economic structure of the Dominion is rapidly changing, and concern is sometimes expressed as to the future of primary industries in the life of the Dominion. In 1900 the population was divided equally between those directly engaged in or dependent on agricultural pursuits, whilst to-day the ratio is 1 : 2. Thus the demands of the people are gradually becoming weighted against the primary industries, and we find urgent consideration being given to a more active development of secondary industries which are not so sound economically, but which are deemed essential for the absorption of a growing population which is surplus to rural requirements under existing conditions.

The development of primary industries can be tabulated in fairly distinct phases each of which are indicative of changing conditions :—

(1) Pioneer stage up to 1880 ;
(2) Extensive settlement on larger holdings, 1880–1900 ;

(3) Intensification of demand for land and the subdivision of Crown land and large private holdings into family farms, 1900–14.

(4) Quiescent period, 1914–18.

(5) Pressing demand for land, inflated values, scarcity of labour, and rapid exploitation of production and labour-saving devices, 1919–30.

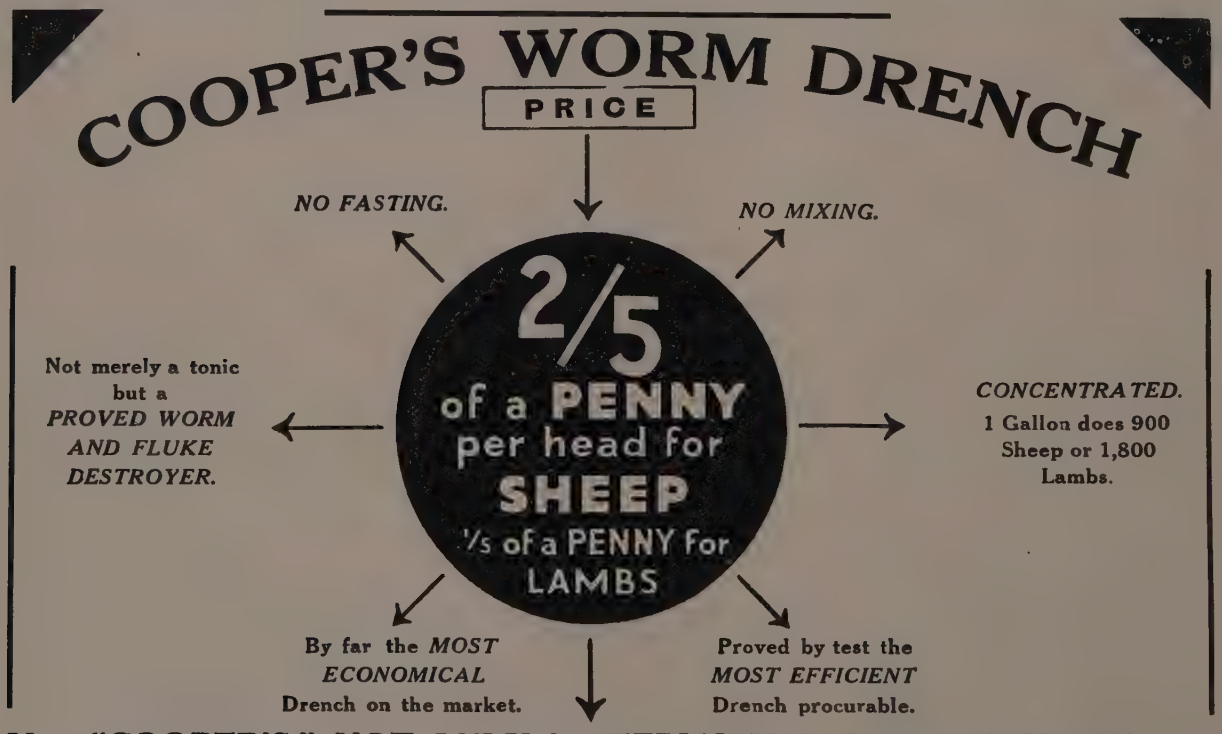
(6) Economic pressure, inability to finance labour, and terrific family effort, 1931–35.

(7) General economic recovery, but some variation in farm organization expected, resulting from difficulty to secure suitable and adequate labour, 1936–37.

If we view the development of agriculture in New Zealand in retrospect, we realize that the processes which have been going on are similar to those experienced in many of the older countries of the world. The structure of rural industries depends to a very large degree on the availability of labour and the ability to employ such labour. With advancing years, greater diversification of employment is offered, and agriculture tends to become a family undertaking. New Zealand to-day is predominantly a country of small farms, and it is likely that the movement in this direction will be accelerated. In some of the older countries similar movement has resulted in a form of farming known as peasantry.

Our economic structure is likely to develop in the direction of greater self-sufficiency in all types of goods. This is demanded as a means of employing available labour which is not required on family farms and cannot be absorbed on other farms owing to labour and wage conditions or to a reduced aggregate need of such labour.

Farms on which no regular labour is employed are more remunerative in wage returns to the owner, no matter what type of farming is undertaken. Thus the trend is likely to be towards more farms of a size which can be handled by the family unit. This movement, if carried to its logical conclusion, should increase the total output of primary products, and thus would be nationally sound. What of the individual? The danger, if danger there be, lies not so much in the principle of small farms supporting the owner's family, but in the non-recognition of its inevitability, and failure in the past to mould land-settlement and agricultural activities to fit in with family requirements. We do not want a peasantry according to the Continental concept, but a country of small-farm units we will surely have, and it is hoped that every endeavour will be made to secure the complete co-operation of the farmers of to-day and mould the policy of agricultural development and education in a manner which will ensure that the primary and secondary industries of the Dominion are truly complementary to each other. If this is not done, the sectional friction which is now apparent will be perpetuated to the national disadvantage.



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Winton Grazing Trial.

Result of the First Year's Operations.

J. M. SMITH, Fields Superintendent, Dunedin.

ABOUT two years ago it was suggested that a grazing trial should be undertaken in Southland to test out the best strains of Southland rye-grass against the Hawke's Bay type, to determine whether or not the former is a better proposition for the purpose of fat-lamb production. There was a general feeling amongst a section of the farming community that while the average commercial Southland rye was not very productive owing to its non-persistency, there did exist persistent lines of rye, as evidenced by a number of old-established, high-productive pastures, and that the seed from such pastures should result in the establishment of pastures that would prove more suitable for Southland's conditions than pastures from the Hawke's Bay strain of rye-grass.

Following action taken by the Grain and Seeds Committee of the Southland Farmers' Union, a meeting of this committee, the Winton Farm Committee, and representatives of the Department of Agriculture was held to discuss the proposals, and as an outcome it was decided to carry out such a trial at the Winton Farm. Each of these organizations contributed towards the cost of the experiment.

Twenty acres of land was acquired, 10 acres being on the Winton Farm and 10 acres being leased from Mr. Robertson by the Department of Agriculture, giving a continuous block of 20 acres of even land, typical of a great deal of Southland, which is devoted to the production of fat lambs. During the 1935–36 season this 20 acres was cropped in such a way that subdivision could be effected giving comparable pairs of paddocks that had been subject to identical cropping prior to the trial being commenced. Early in the spring of 1936 the area was surveyed and subdivided into eight paddocks, each being exactly 2½ acres in area. Four of these paddocks were given the letter A and four the letter B, and at a suitable opportunity a draw was made to determine which series should be sown with Southland rye and which should be sown with Hawke's Bay. The pairs of paddocks were exactly the same, so that there was nothing to be gained by either strain of rye-grass in the draw, but it was felt that this would be the fairest method of determining the matter. As a result of the draw the A paddocks were sown with the Southland rye and the B series with Hawke's Bay.

Some little difficulty was experienced in obtaining the necessary Southland seed, as it was ruled by the committee that the seed had to be obtained from areas at least ten years old and that ten lines were to be used in a blend. Likewise ten lines of Hawke's Bay rye was to be blended for sowing in the B paddocks. It should be made quite clear at this stage that the trial is not between certified and uncertified seed, but between the best type of Southland rye and the best type of Hawke's Bay rye, and actually some of the Southland rye used in the blend was quite up to, and actually eligible for, certified standard seed. Another stipulation made, and one that was rigidly adhered to, was that the Hawke's Bay seed should be drawn from stores in Otago and Southland, to ensure that similar seed to that being sold and used in Southland should be put down in the trial. A word of thanks is due to the Southland farmers who enabled seed to be saved from suitable old pastures and to most of the growers who supplied the seed gratis. All lines used in the blends were put through an official germination test, the Southland lines giving an average test of 91·2 per cent. and the Hawke's Bay 95·6 per cent. To counteract this variation the Southland rye was increased to a rate sown commensurate with the difference. After a thorough preparation of the seed-bed the paddocks were sown down on the 22nd to the 28th October, 1936, each pair of paddocks—*i.e.*, an A and a B—being sown the same day. Thirty pounds of rye-grass and 3 lb. of white clover was sown, the clover being of an uncertified type. Prior to sowing the land was limed with carbonate of lime at the rate of 1 ton per acre while 2½ cwt. of superphosphate per acre was sown with the seed.

FIG. 1.—At the junction of the two races: 3B (Hawke's Bay), immediately behind gate; 3A, to left behind gate; 2A (Southland), through gate on right in foreground; 2B, through gate on left foreground. Note gates with coloured bar corresponding to colour mark on respective flocks.

Following the sowing down, subdivision fences were erected and water was laid on to each paddock. Early in January the trial was reported on, it being stated

that the pasture had established well, although there was a heavy growth of yarr (spurrey) occasioned by the wet season. To check this weed the committee decided to graze the whole area with a common flock, and 123 dry ewes and 85 ewes with 100 lambs were used for this purpose. Again, early in February it was deemed necessary to carry out a common grazing to control the growth of yarr on Robertson's 10 acres. Following the recovery from this grazing the experimental flocks were used to control growth, and the experiment proper started.

One hundred and twenty two-tooth ewes were purchased by the Winton Farm Committee, and these were divided into two flocks, one to be utilized always on the Southland paddocks and to graze on no other, while the other flock was to be used entirely on the Hawke's Bay paddocks. To ensure an even division of the ewes they were run off through a race and the Southland flock were then given a distinguishing earmark and branded red, while the Hawke's Bay flock were earmarked and branded green. To make sure that no mistakes could be made, the gates into the paddocks were also painted green and red, the red-branded sheep always going through red gates and the green-branded sheep through the green gates. At the end of April two Southdown rams were put out with each flock, and these rams were changed periodically from flock to flock to ensure that an absolute minimum of difference in the lambs of the respective flocks could be attributed to the rams. The ewes, being young animals, will be kept on right throughout the five years of the trial, although replacements and additions will be necessary from time to time. One of the difficulties that may be experienced will be in connection with the condition of the ewes in the late summer and autumn, but these difficulties will just have to be dealt with as they arise.

FIG. 2.—Race opening into 1A (Southland). 1B (Hawke's Bay), on left, and 2B (Hawke's Bay), on right. Note water-trough in fence-line and ungrazed condition of race, which area does not come into the trial.

Towards the end of May a point analysis of the pasture was made to determine the composition of the sward, and it resulted as follows :—

(Points given are averages.)

	Hawke's Bay Paddocks.	Southland Paddocks.
Bare ground ..	32	49
Rye-grass ..	71	55
White clover ..	5·5	4·1

This indicated a significant difference in favour of the Hawke's Bay as far as initial establishment of rye-grass is concerned. Following five months' grazing, during which a very wet winter was experienced, when it was necessary to remove all animals from the trial for a period, a further point analysis was made on the 19th October, 1937, and this resulted as follows :—

	Hawke's Bay Paddocks.	Southland Paddocks.
Bare ground ..	30·6	29·8
Rye-grass ..	79·5	76·1
White clover ..	11	10·5

On this comparison there is little between the two pastures as far as the composition of the sward is concerned.

There has been a considerable difference in vigour of spring growth, however, in favour of the Hawke's Bay pastures, and it has been necessary to considerably increase the stock on these pastures to utilize the extra feed grown. During the autumn and early winter months there was really nothing between the two lots of rye as the grazing figures indicate, but from September onwards the figures show an outstanding difference.

FIG. 3.—1A (Southland) in foreground; 2B (Hawke's Bay), beyond fence.

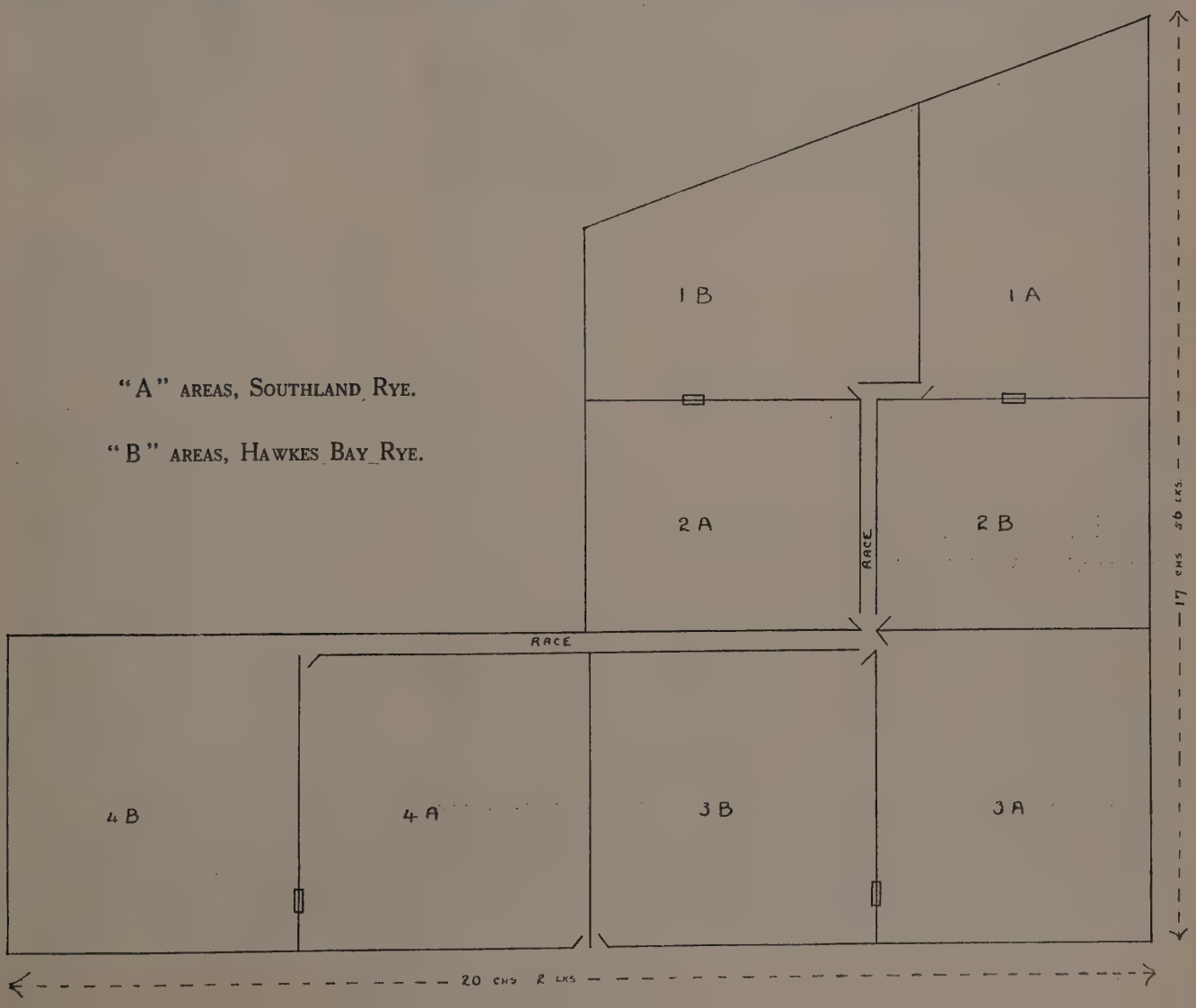
Owing to the partial failure of the swede crop and the extremely wet conditions during the winter, the flocks were removed from the trial paddocks during August, when they were on swedes with a common run off. It should be here explained that only the grazing figures of three trial paddocks are being considered, as the fourth paddock of each series is being treated for a holding paddock for surplus stock from the respective flocks. This is considered necessary to ensure that the flocks, including the surplus animals, are always on the same type of pasture. The grazing figures then for the period up to 31st October, 1937, of the first three paddocks of each series are as follows :—

(Figures are grazing days, each figure representing one sheep for one day.)

	Hawke's Bay Paddocks.				Southland Paddocks.			
	1.	2.	3.	Total.	1.	2.	3.	Total.
February	..	..	242·27	242·27	..	..	242·27	242·27
March	192·0	192·0	219·21	603·21	192·0	192·0	219·21	603·21
April	240·0	240·0	189·60	664·60	240·8	240·8	189·60	664·60
May	198·4	198·4	143·07	539·87	198·4	198·4	143·07	539·87
June	183·2	183·2	128·46	492·86	183·2	183·2	128·46	492·86
July	180·0	180·0	173·07	533·07	180·0	180·0	173·07	533·07
August	..	..	..	..	..	..	..	..
September	101·0	101·2	63·46	265·66	66·0	66·0	63·46	195·46
October	486·2	490·2	253·07	1,229·47	226·3	284·4	223·55	734·25
Grand totals	..	..	..	4,571·01	..	..	..	4,005·59

This result is probably only to be expected, and the grazing figures are only one factor that is to be taken into consideration in the final results, although, of course, a very important one. Other matters, such as fat-lamb records, percentage of lambs off mothers, wool-weights, animal health, palatability, &c., have all to be given consideration in due course.

The results to date, however, are most interesting, and form the first interim report of what promises to be one of the most important trials ever carried out in Southland.



Factors in Successful Farming.

(1) Introduction.

W. N. PATON, Senior Investigational Officer.

Farming as a Calling.

WHY choose farming as a calling in life, and what advantages and disadvantages exist in this as compared with other occupations? Amongst the advantages may be mentioned the healthy and congenial nature of open-air working conditions and general rural environment for self and family. On the whole the type of work is not heavy all through and is sufficiently varied not to become uninteresting. Probably one of the most satisfactory features of farming is the degree of independence and freedom from possible irksomeness as when working under others. To the efficient man also, farming offers a permanent occupation. The scope for the realization of one's ambitions in such a calling is limited in the main only by personal shortcomings, and the knowledge that any enhanced returns dependent on one's own efforts and ability can be derived is most exhilarating indeed.

The disadvantages of a farming life do not loom very large to-day, since most modern amenities have been brought to the farmer's door. There is some justification for the complaint of longer hours in farm-work than generally exist in other occupations. However, if we consider a class of livelihood possessing in many respects similar advantages to that of farming as instanced in the case of the small city or suburban shopkeeper such as dairies, fruiterers, and confectioners open for business for long hours, the comparison is then in favour of the farmer. In the main, therefore, there is a lot that recommends farming as a vocation in life, particularly to that type of person who values independence and is prepared to forego something for that object. But is farming profitable?

Is Farming Profitable?

When it is considered to what extent agriculture is assisted to-day in ever so many countries of the world (whether they be comparatively large importers or exporters of farm-produce, or more or less self-sufficient in this respect) in such directions as controlled production and trade, fixation of prices and wages, and in direct and indirect subsidies and forms of assistance through taxation and levies, one may well ask this question. It is not intended to attempt to provide a direct answer to this question; but before passing on to further comment it may be pertinent to add that the farmer is placed in a different position to the rest of the community in that he does not fix the price of the goods he sells. The farmer has been disposing of his farm-produce for what it would fetch for so long a time now that none seem prepared to alter the conventional method. Due to this weakness in his selling the farmer has not been able to consistently extract a return in accord with costs of production, and hence, because of this and the importance of agriculture to the State, has had to be assisted in some way or another.

This assistance takes many and varied forms, both direct and indirect, and in the course of time becomes more or less fixed in the economic fabric to such extent that a change-over to farmers' own prices would be too disturbing. In any case, consumers have been long accustomed to certain levels of retail prices for farm-produce, and consumption would undoubtedly be adversely affected for some considerable time if consumers were asked to pay the full price directly, instead of part of it directly and part of it indirectly. Before it would be safe for farmers to fix a full price for their produce they would need to be able to control or suspend production as the need arose just as is done in the manufacturing industries. This is not practicable, and hence the present system of disposal is adhered to. It is true, however, to say that the farmers' case is being safeguarded to-day to a much greater extent than hitherto, and in the main he is getting a fair deal from the rest of the community.

Looking at farming as a business that should return a reasonable rate of interest on capital invested, a comparison may well be made with investments in stock and shares where any ability to regularly pay more than the current rate of interest becomes capitalized sooner or later in the enhanced price of the said stocks or shares. In order to obtain a higher rate of return than the current rate of interest it is necessary to either increase profit-earning capacity subsequent to investment or to have purchased at an advantageous price. As it is in business, so it is in farming, and one of the big factors to be concerned in considering profitability is competition. Farmers do not recognize this point readily enough as do business men. Everywhere and in everything to-day there is keen competition, and progress in efficiency of working and management. The advantages of the introduction and utilization of new and superior methods are soon lost once they become more general and capitalized. We are helpless to prevent progress, and hence we have no alternative but endeavour to keep pace with it. We may divide men into three main groups with regard to success at their callings—namely, those below the average, those around the average, and those above the average. Hence real success is relative. It is not only a matter of being in the front to-day, but also of maintaining that relative position to-morrow, or, better still, of improving it.

Success in Farming.

So rather than consider the direct answer to the question, "Is farming profitable?" is it not more to advantage to discuss success in farming and what main factors are attributed to it? That is the purpose with which the writer has set out in the course of a series of articles which are to appear monthly in this *Journal* during the current year. The articles will appear under the following headings, and will be dealt with in the order given:—

(2) Points to be considered in buying a farm.
(3) Economic valuation of a farm.
(4) Points to be considered in purchasing live-stock and plant.
(5) Factors in farm development.
(*a*) Extension and intensification.
(6) Factors in farm development.
(*b*) Economic unit increases.
(7) Farm working and maintenance.
(8) Live-stock replacement and improvement.
(9) Live-stock barometers.
(10) Farming efficiency and recording.
(11) Farm accounts and budgeting.
(12) Planned farming.

Pig-feeding Experiments.

Trials at Ruakura Farm.

C. E. BALLINGER, Assistant Experimentalist, Ruakura Farm of Instruction.

THE practice of creep feeding the litter from about three weeks of age to weaning is all-important in the production of well-grown litters and good weaning-weights. It is a phase in the life of the pig, however, which receives little attention by many pig-breeders and leaves room for a good deal of improvement. It is usual for litters to take readily to supplementary feeding at about three weeks of age. At this period the suckling pigs have reached the stage where the mother's milk is insufficient for their increasing demands, and while there are instances where the sow is a heavy milker and the young pigs do not look for other food until they are four or five weeks, yet it is a good policy to place feed in the creep trough when the litter is fourteen to twenty-one days old. A little meal scattered on the floor of the creep soon attracts the curiosity of the young pigs, and from the floor they soon find their way to the trough.

By means of this system of creep feeding the young pigs are carried forward without a check in their growth-rate, and the small quantity of food consumed at the commencement of feeding, followed by the rapidly increasing consumption towards the end of the suckling-period, accustoms the young pigs to a variety of feed, solid and liquid, without causing any digestive troubles. The digestive troubles found in litter feeding, such as indigestion and scouring, are more frequently caused by allowing the young pigs to go hungry for several hours followed by a large meal, which overtaxes the young pigs' digestive organs, than by protein rich meals or sour milk.

There is, however, little definite information on litter feeding applicable to New Zealand conditions, and this also applies to a great extent elsewhere. Inquiries made at experimental institutions in Great Britain indicated that no definite work had been carried out with regard to the quantities fed and the nutritional value of the various feeds used. In general, the advice offered was that young pigs should receive concentrates, such as flaked maize, pollard, barley meal, soya-bean meal, &c. The addition of skim-milk was strongly advised as being palatable and easily digested.

Pigs on skim-milk and curd. Type of feeder used in the trials and removed from the creep for photographing.

Conditions of pig-raising in Britain and elsewhere are very different from those existing in New Zealand. In Britain the sows are usually stied for farrowing, while anæmia and scours are a common source of mortality in the litters. Under New Zealand open-air conditions these diseases are not so prevalent and our home-grown feeds differ to some extent. Skim-milk figures largely in our feed-supply, and this is usually supplemented by some form of meal.

Information applicable to New Zealand conditions has been published in a general way, chiefly by the pig-recording societies. The Manawatu-Oroua Pig Recording and Development Club in their publications on pig-keeping stress the importance of supplementary feeding by means of the creep system. The Waikato Pig Recording Club also stresses the advantages of creep feeding, and give a feed table in which approximate quantities of meat-meal or grain-meal, together with skim-milk, are given.

The New Zealand Department of Scientific and Industrial Research (Bulletin 17, 1930) has published a survey of the pig industry in the Waikato, Manawatu, and Canterbury districts. Here also the importance of creep feeding is stressed.

Supplements used in Litter Feeding.

In all literature on the feeding of litters the use of meals such as pollard, meat-meal, &c., is advocated, and, providing such meals are kept dry and replenished periodically, they are a convenient and reliable method of providing the extra feed for the production of heavy litters. In New Zealand, however, there are other feeds which are used, and it is maintained with good results. Some pig-farmers make a practice of feeding the curd taken from a barrel of skim-milk which has been allowed to sour. Others feed a small quantity of whole milk with the skim-milk, and maintain that such pigs possess a "bloom" not present in pigs fed on other feeds. In maize-growing districts the maize corn is often soaked and fed whole. Finally, one finds sows and litters fed on skim-milk alone and with excellent results.

Underlying these results is the need for investigation into the merits of these

various feeds, and this work is now proceeding at Ruakura Experimental Farm.

Value of Skim-milk.

It must be remembered that under farm conditions the litter always has access to the mother's trough, and many farmers who provide meals by means of a creep do not provide skim-milk other than what the litter obtains from the sow's trough when she is fed. The digestibility and feeding-value of skim-milk is often not appreciated as it should be. It is regarded as being a bulky feed, and the fact disregarded is that the bulk is water, which is readily got rid of by the animal-body. It is possible, therefore, that the feeding-value ascribed to this or that meal should be credited to a great extent to the skim-milk fed with it.

In feeding skim-milk or curd to young pigs it must be borne in mind that while both can be fed safely when sour they should not be left in the trough for more than one day. If skim-milk or curd are allowed to remain longer decomposition of the protein is liable to set in, and the milk or curd becomes rotten. In this condition the young pigs will not touch it unless starved. If starved into eating this decomposed material digestive troubles and poisoning are liable to occur.

This is one of the main reasons for advocating the use of meals and for allowing the suckers to obtain milk from the mother's trough. The mother's trough is, however, liable to be empty for several hours of the day, and young pigs want access to food at all times, since their capacity at any one time is very small.

In order to obtain definite information on the various factors involved in litter feeding, preliminary trials were commenced at Ruakura last autumn, when a number of litters were fed under stied conditions. The litters were separated from the sow for one hour three times a day, and during those periods the litters were allowed as much as they cared to consume. It was found, however, that the young pigs would eat much more if allowed access to the food at all times.

The supplementary feeds used were (1) skim-milk, (2) whole milk, (3) curd taken from soured milk and allowed to drain for a few hours, plus skim-milk, (4) a pollard-and-meat-meal mixture and skim-milk, (5) skim-milk and whole maize.

The trials carried out this spring have been with the same feeds, and, in addition, meat-meal and skim-milk are being used. The whole-milk ration has been reduced to 4 gallons per piglet, plus skim-milk. In all the trials the litters are allowed as much meal, skim-milk, &c., as they care to consume. The meals are fed dry. Special feeders are used which prevent the meals becoming wet and the pigs from getting their feet in the trough. The skim-milk, meals, &c., are measured and the daily consumption noted, and the troughs are cleared each morning to prevent fouling.

There are many factors involved in obtaining good litter-weights, and while feeding plays a large part there is a number of points about which more information is needed. There is the influence of nutrition on the sow during pregnancy, and its effect on the growth-force of the litter. There is also the importance of the birth-weight of the litter and the effect of the number born on the birth-weight and subsequent live-weight gain to weaning. At present the work at Ruakura is in the early stages of investigation, but the following results indicate the kind of information that is being collected.

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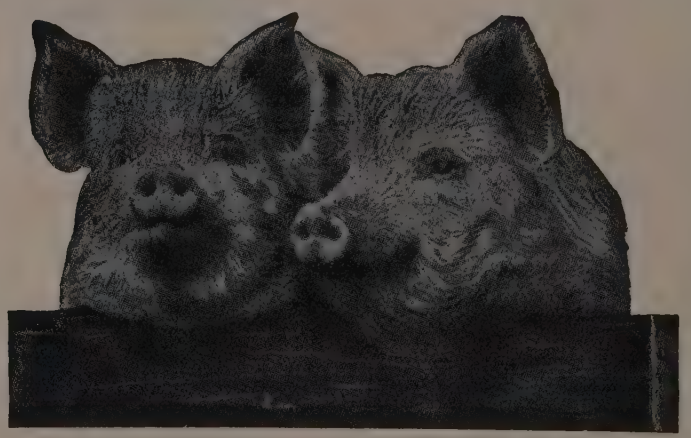

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All litters are weighed at birth and at weekly intervals. The sows are fed three times a day on skim-milk only. Feeding is done outside the pens so that the young pigs cannot get food, other than the mother's milk, in addition to that offered in the feeder.

The following is a summary of the trials completed at present, and while the results are by no means conclusive they emphasize one important point—*i.e.*, that good weaning-weights of 40 lb. or better can be obtained with a variety of feeds, some of which can be produced on the farm.

In the following tables the consumption of skim-milk, meals, &c., are given per pig per week for the three to eight weeks' period of feeding, and form a useful guide to the quantities of feed consumed by suckling pigs :—

Trial 1.—Ration: Skim-milk.

FOOD-CONSUMPTION, SKIM-MILK (PINTS).

Consumption	12·9	33·2	51·6	73·5	89·0
Age of pigs (weeks)	3–4	4–5	5–6	6–7	7–8

Total consumption = 32·5 gallons of skim-milk per piglet.

LITTER-WEIGHTS.

The mean weight per piglet on this ration was as follows :—

Age of piglets (weeks) ..	3	4	5	6	7	8
Mean weight (lb.)	10·7	14·5	20·5	27·1	34·0	41·9

Trial 2.—Ration: Skim-milk and, in addition, 4 Gallons of Whole Milk per Piglet over the Five-weeks Period of Feeding.

FOOD-CONSUMPTION (PINTS).

	S.	W.	S.	W.	S.	W.	S.	W.	S.	W.
Consumption	9·8	2·8	13·3	4·9	33·2	7·0	51·0	7·7	64·5	9·8
Age of piglets (weeks) ..	3–4		4–5		5–6		6–7		7–8	

S = skim-milk ; W = whole-milk.

Total consumption = 4 gallons whole milk and 21·5 gallons skim-milk per piglet.

LITTER-WEIGHTS.

Age of piglets (weeks) ..	3	4	5	6	7	8
Mean weight (lb.) ..	11·4	16·0	20·2	26·6	32·8	40·7

It will be seen that the mean weight per weaner is only slightly less than that given in Trial 1 (skim-milk only). It would not be sound to make any comparisons at this stage of the trials between skim-milk and skim-milk plus small quantities of whole milk, and the trial will need repeating. The feed-value of whole milk is approximately double that of skim-milk, and if the quantity of whole milk given above is doubled, then the total milk consumed in terms of skim-milk is 29·5 gallons. In Trial 1 the skim-milk consumed was 32·5 gallons, a difference of 3 gallons in favour of Trial 1, which is in agreement with the slightly better weaning-weight.

The greater value of whole milk compared with skim-milk lies in its fat and vitamin content. Vitamins are important in disease-resistance and other factors that go to promote good health, but under the open-air system of pig-raising in New Zealand sunlight and green grass are abundant, and the vitamin factor is less important for pigs than in Britain or where sows and litters are stied.

The practical value of the trial lies in the fact that with regular feeding good litter-weights are to be obtained with skim-milk alone or by the use of a small quantity of whole milk plus skim-milk.

Trial 3.—Ration: Pollard and Meat-meal Mixture plus Skim-milk.

The following results were obtained by the use of this ration :—

FOOD-CONSUMPTION.

	S.*	M.	S.	M.	S.	M.	S.	M.	S.	M.
Consumption	8·2	0·5	17·1	1·5	19·1	1·5	39·4	4·0	54·9	4·5
Age of piglets ..	3–4		4–5		5–6		6–7		7–8	

S. = skim-milk ; M. = meal.

* Skim-milk in pints ; meal in pounds.

Total consumption = 12 lb. of meal and 17·2 gallons of skim-milk per piglet.

LITTER-WEIGHT.

Age of piglets (weeks) ..	3	4	5	6	7	8
Mean weight (lb.) ..	11·7	17·1	23·3	28·7	36·6	44·3

It will be seen that excellent weaning-weights are obtained with this ration. The feeding-value of the meal used was approximately 1 lb. of meal equivalent to 1 gallon of skim-milk, and this value gives the total units eaten as 29·2, a similar quantity to that consumed in Trial 2, but with a superior weaning-weight.

Trial 4.—Ration: Meat-meal and Skim-milk.

The results of this trial are summarized below:—

FOOD-CONSUMPTION.

	S.*	M.	S.	M.	S.	M.	S.	M.	S.	M.
Consumption	7·8	1·0	12·0	1·3	28·7	3·3	46·8	3·7	76·8	3·5
Age of piglets (weeks) ..	3–4		4–5		5–6		6–7		7–8	

S. = skim-milk; M. = meal.

* Skim-milk in pints; meal in pounds.

Total consumption = 12·8 lb. of meat-meal and 21·5 gallons of skim-milk per piglet.

LITTER-WEIGHTS.

Age of piglets (weeks) ..	3	4	5	6	7	8
Mean weight (lb.)	10·8	16·1	20·1	26·1	33·5	42·0

Trial 5.—Ration: Skim-milk and Curd.

This trial is of practical interest to the dairy-farmer since curd is easily obtained by allowing a barrel of milk to stand for a few hours until curdling takes place and by skimming off the resultant curd when it has become firm. The curd used in this trial was obtained in this manner and placed in a metal strainer to allow the small amount of whey present to drain away. Fresh curd was fed each day, and the young pigs consumed this feed readily from the commencement of the trial and the results obtained are given below:—

FOOD-CONSUMPTION.

	S.	C.*	S.	C.	S.	C.	S.	C.	S.	C.
Consumption ..	12·3	3·7	20·5	4·5	43·0	10·7	56·1	15·9	65·3	19·7
Age of piglets (weeks)	3–4		4–5		5–6		6–7		7–8	

S. = skim-milk; C. = curd.

* Curd, in pounds.

Total consumption = 54·5 lb. of curd and 24·6 gallons of skim-milk.

LITTER-WEIGHTS.

Age of piglets (weeks) ..	3	4	5	6	7	8
Mean weight (lb.) ..	11·3	17·2	22·4	29·6	36·7	42·6

The results of this trial are very satisfactory. The quantity of skim-milk consumed again forms a large portion of the total feed consumed. The amount of curd eaten appears to be considerable, but as it contains a considerable quantity of water even when allowed to drain for a few hours the actual dry matter of the curd is probably about one-fifth of the quantity given, which brings it into line with the quantities fed in the other trials.

It will be seen that all of the trials outlined in this article have given satisfactory results, and while no conclusions can be made at this stage as to the superiority of any one feed over the others it is obvious that good results are obtainable with skim-milk, curd, &c., as well as with meals. Finally, it will be plainly seen from the quantities of skim-milk, meal, &c., consumed that considerably more feed units were obtained from the skim-milk than from the supplements fed with it, and this should emphasize the importance of giving the litters access to good skim-milk at all times.

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FACTORIES THROUGHOUT NEW ZEALAND

Influence of Salt on the Flavour of Butter.

G. M. VALENTINE, Assistant Director of the Dairy Division.

ADVICES received from Great Britain during recent months indicate that the question of "saltiness" in butter is one which has been giving concern to manufacturers and to those connected with the sale of imported butters, including New Zealand butter. The following statement is made with the object of placing the position before New Zealand creamery managers, the conclusions reached being based on Home reports and from information available in the Dominion.

The organization of the butter industry under the creamery system in Great Britain, as the result of the operations of the various Milk Boards, has brought about conditions which are more or less comparable with New Zealand with the exception of the long period of storage. Reports indicate that the same problem has been met by British creamery managers, and that steps have been taken to have some experimental work carried out with the object of finding the cause of this salty or bitter flavour.

The probable re-entry of New Zealand into the German market makes it necessary to take steps to avoid any danger of complaints of this nature, as the following extract, quoted from a German publication dealing with the German dairy industry, will show :—

"About 50 per cent. of the butter used and produced in Germany is unsalted, the other 50 per cent. is salted—that is to say, there is an average of 0·5 per cent. salt in the finished product. Medical experience, which has caused doctors to urge people to eat as little salted food as possible, has also led to reducing the amount of salt in butter from an average of 2 per cent. twenty years ago to 0·5 per cent. to-day. As the amount of unsalted butter increases in consumption it may be assumed that within the next few years the salt in butter will disappear more or less completely. This development would be specially welcomed because experience has shown that unsalted butter tends to keep better. This fact is of unqualified importance on account of the stock of butter kept in storage in Germany to balance the market."

Reports from Great Britain.

While the statement regarding the keeping-quality of unsalted butter may be true of high acid Continental butter, it may not be true of low-acid New Zealand butter, but from the number of instances in which "oversalting," "salty flavour," "astringent with salt," and "harsh flavour" have been mentioned in recent reports it seems obvious that some new practice must have been adopted in the manufacturing procedure in the creameries in New Zealand, and the question was referred to all butter instructors asking for suggestions regarding the possible cause of these criticisms. In our circular the following extract from a letter from Mr. Taylor, dated London, May, 1937, was quoted :—

"You will have noticed of late that a considerable number of our reports on butter quality have contained comments describing the butter as 'astringent,' 'oversalted,' or 'harsh through salting,' and you will doubtless have been a little concerned as to what is the cause of this. Some time ago I drew your attention to this matter, and I know that you were inclined to the opinion that a number of our butters were showing this defect. I feel quite safe in stating that this is the opinion of all your London officers, and I really think the matter will require some investigation.

"I must confess that I am rather at a loss to explain the technical reason for this defect in our butters. It seems to have become more prevalent within the last two seasons, and I am quite sure that it is not altogether a matter of the quantity of salt used so much as a question of either the type of salt or the processing of the cream. But whatever it is, it certainly needs some adjustment."

The opinions expressed in this letter are supported by the trade and by persons other than the officers of the Division who have had an opportunity of examining New Zealand butter in Great Britain, and they have commented on the "astringency" mentioned above, meaning the contraction at the back of the mouth which is felt after tasting a number of samples of butter of a salty character.

It also indicates that the criticism is not confined to butter which actually contains a high percentage of salt, a class of butter which would be quite acceptable to some buyers provided it is free from this astringent character, but refers also to butter which has a comparatively low salt content but gives an impression of being oversalted. This suggests that it is either the character of the salt, the method of salting, or a combination of salt with some other characteristic, which is responsible rather than the percentage of salt, and a number of suggestions giving the possible causes have been made in the reports from London.

Suggested Causes of "Salty" Flavour.

The harsh flavour generally associated with a combination of salt with acid, which is sometimes so pronounced that it is described as metallic, is commented on a number of times in describing butter made in those districts where starter is in general use. This does not necessarily mean that the salt content is high, but that it is too high for the type of butter being made, and that the fine adjustment between salt and acid which is necessary if the delicate flavour imparted by the starter is to be retained in this class of butter has not been achieved.

This is probably the reason for the low salt content of the German butter, already mentioned, in common with other European butters, which are made from high-acid cream and seldom contain more than 1 per cent. of salt, while some are either very lightly salted or are made without any salt, as the addition of salt encourages the development of a fishy flavour. Excess neutralization is also mentioned, and the salt-soda combination, which is not unlike the salt-acid flavour, is generally accepted as one of the causes of harsh flavour in butter.

These possibly account for the complaints regarding some of those churnings which have been found to contain a low percentage of salt, but they do not explain this defect in butter, which is only lightly salted, and which is made from sweet cream, with little or no neutralizer added.

It can be accepted, however, that those boxes which give an impression of being oversalted when compared with others under examination in the same line and which contain the same percentage, have an objectionable character associated with salt, a peculiarity in foodstuffs which is not confined to butter.

Opinions of Instructors.

Suggestions received from instructors regarding the possible causes of these complaints, other than high salting, were as follows :—

(1) That a higher percentage of salt can be added to butter made from sweet cream received daily than can be added to butter made from ripened cream.

(2) Excess processing of cream.

(3) It has been noted that complaints of a bitter flavour in the butter are frequently received from the graders following the use of a new shipment of salt in a free, dry condition. These complaints cease when the amount of salt used is reduced or after the salt has been in stock for some time.

(4) Uneven distribution of the salt through the butter due to insufficient working, the same cause as that responsible for "spotted" colour.

(5) Butter which gives no impression of oversalting when fresh will sometimes do so after storage.

Comment on Suggested Causes of Complaints.

(1) The suggestion made under (1) is generally accepted buttermaking practice providing the salt is thoroughly incorporated with the butter.

(2) Grouped under this heading are severe treatment of cream in the vacreator; the addition of large quantities of water to thick viscous cream before pasteurization; excess neutralization. All of these tend to produce a neutral fat, while the last has a flavour of soda in addition. It has been found that when making this class of butter the amount of salt must be reduced in order to avoid a harsh flavour.

(3) In the early days of creamery buttermaking it was believed by some makers that it was necessary to sterilize salt before use, and this was done by heating it in an oven shortly before adding it to the butter. Many creameries to-day have salt stores fitted with steam-pipes which would have the effect of keeping the salt in the dry, hard condition previously referred to. The statement made under (3) is supported by the evidence of creamery managers, and the disappearance of the bitter flavour after the salt has been held in store for some time in rooms without special heating-appliances is no doubt due to the softening of the salt as the result of the absorption of moisture from the atmosphere.

In some instances a certain brand of salt has been blamed for producing a bitter flavour in butter, and a change to another brand has been said to get over the defect. As a similar change in the reverse order is claimed to have got over the same difficulty in another case, the condition of the salt is probably the real explanation.

The salt in general use in New Zealand creameries is of the highest quality, and apart from any damage in transit it is the best available from the point of view of purity. It may be, however, that a mistake has been made in insisting on an almost entire absence of impurities as the processing necessary to get rid of them seems to have the effect of producing salt of a hard crystalline character which does not dissolve readily and sets very hard during storage. The presence of small amounts of impurities has been shown by Hunziker ("The Butter Industry," page 334) to have no harmful effect on the quality of the butter, and the reports under consideration show definitely that some of the purest brands of salt give a bitter flavour in the butter made under certain conditions.

(4) Uneven distribution of the salt and "spotted" colour refers to a defect which has made its appearance in a few isolated cases during the last two or three seasons. This butter contained large numbers of small spots of a higher colour than the portion surrounding them. Examination under a powerful lens showed that the centre of each spot consisted of salt in solution, and by collecting them and testing with nitrate of silver the salt content of the "spots" was shown to be much higher than that of the surrounding butter.

Causes of "Spotted" Colour.

Briefly, the conditions which were found to be responsible for this were as follows:—

The raising of the churning temperatures to 50° F. or over in order to overcome the reduced capacity of the churns which was due to the dilution of the cream, and the smashing of the fat globules as the result of vacreation of the cream.

The resulting butter was of a soft, spongy character which not only retained a high percentage of free water, but tests showed that it also held a much higher percentage of moisture within the granule than did butter churned at a lower temperature. In order to secure better drainage of the wash water the practice of continuing the churning process until the butter had reached the size of walnuts instead of the smaller and harder granule formerly aimed at became common. This reduced the surface area available for distribution of the salt through the butter before working commenced, but, in addition, the practice of partially working the butter in order to get rid of the excess free water before the salt was added was adopted as a general practice in some creameries. As a result of these changes in buttermaking practice the working-period was very much reduced and the maximum moisture content was reached before either the working was completed or the salt dissolved and evenly distributed through the butter.

A return to lower churning temperatures and smaller granules corrected this defect.

The conditions described seem to apply to the defect under discussion and may account for many of the complaints, as it is a fact that churning temperatures generally are now higher than those used a few years ago, but there are other factors which must be taken into account.

(5) There is evidence to support the contention that the salty character of butter is more pronounced after storage as this has been noted in connection with the re-examination of butter held for keeping trials in many instances in New Zealand, while this opinion is also held by some Continental buyers.

Reasons for Salting Butter.

Salt when added to butter serves two purposes. It acts both as a preservative and a flavouring, although in some butters, as already stated, it may encourage the development of fishy flavour.

Before cold storage became available it was the only means of keeping butter from the flush months of summer to the period of scarcity in winter, and the percentage added was such that butter of this class was known as salt butter to distinguish it from powdered or mildly salted table butter.

At that stage, and even later under creamery conditions, the practice followed was to partially work the butter on the day on which it was churned and to complete the working the following day. The colour when the second working was started was very streaky. The object of holding the butter over was to allow it to firm up between workings and to give time for the salt to dissolve. Under the best conditions it could not be claimed that the salt and water were evenly distributed through the butter with the methods of working then available, and streaky colour even in the finished butter was a common defect. (The salt in general use at that time was made on the pan system.) This practice was continued in some creameries for a considerable time after mechanical refrigeration came into general use in the dairy industry as it was not yet realized that in the control of the temperature of the cream and of the wash water lay the solution to many problems in buttermaking. In some creameries it continued until the box churn and circular hand-worker were discarded in favour of the combined churn and worker, which, in conjunction with control of churning temperatures, made it possible to complete the working at one operation without danger of streaky colour or grittiness in the butter.

Influence of Water.

Water mixed with butterfat reduces the colour while salt produces a deeper shade of colour. The object of working butter is therefore to consolidate the granules and to mix the water and salt evenly through it in order to produce an even colour and a smooth close texture which will show no free moisture. Unless the process is carried to the right stage the texture will be open, the moisture and salt will show on the surface when cut, and the free brine will give an impression of saltiness quite out of proportion to the actual amount of salt present. The flavour will be coarse owing to the uneven distribution of the salt, a feature which

is common to other food products when the mixture of the ingredients is not thorough. The limiting factor when working butter is the legal limit of moisture which is allowed in the finished butter, and two points must be kept in mind in carrying out the process. If the temperature of the cream is too low the butter will be hard and dry when the salt is added, and the texture may be destroyed before the moisture content has reached the desired figure. If the cream is too high in temperature the butter will be soft and will retain a large percentage of water and will reach the legal limit of moisture before the working has been completed or, in other words, has been carried on long enough to thoroughly distribute the moisture and salt. In the first case the butter will be overworked and have a salvy texture, and in the second it will be insufficiently worked, the texture will be open and show loose moisture, and the colour will be streaky.

In order to avoid these defects a number of changes have been made in the methods followed since the combined churn and worker came into use. The first churns of the detachable worker type required up to forty minutes to incorporate the water into the butter made from cream churned at temperatures in the vicinity of 40° F., and the fairly general practice was to retain more water in the churn when draining than was required to bring the moisture content of the finished butter close up to the legal limit of 16 per cent. The amount of water present in the churn when combined with the salt provided conditions which practically amounted to brine salting, and the long working-period allowed the salt to completely dissolve and become thoroughly mixed with the butter before the working process was completed, although a portion of the salt was lost when the excess brine was run off before the final working was given.

In many creameries the salt was simply thrown into the churn in one lot, and in some instances it was not even sieved, but colour defects were seldom found in the finished butter when the salt content was not excessive.

Types of Churns.

The barrel of the churns of this type had a slope of 1½ in. from the front to the back and only one draining plug. It was partly due to this that the distribution of the moisture in the finished butter was sometimes very uneven and varied as much as 1½ per cent. between one end of the roll and the other. Although the box taken by the graders for grading and analysis might be found to contain more than the legal limit of moisture it did not follow that a sample taken from another box would show the same result, but the whole churning was returned to the creamery. Such happenings naturally caused attention to be concentrated on the problem of even distribution of the moisture, as it was the aim of every buttermaker to work as close up to the legal limit as possible. But as there was no regulation limiting the salt content of butter until the year 1930 little attention was paid to it until after that time.

Under present-day practice the buttermaker aims at draining off the wash water until the amount retained in the churn will be as nearly as possible the quantity required to bring the percentage contained in the finished butter to the desired maximum. The amount of water and salt run off after a trial test has been made for moisture will in most cases be very small, and it may even happen that the amount retained is not sufficient to bring the moisture content of the butter up to the desired figure.

The barrel in the internal worker churn which is in general use to-day has parallel sides, is consequently level on the bottom, and drains at three equidistant points from back to front. It can be accepted that the water is fairly evenly distributed through the butter after draining, and little difficulty is experienced in turning out churnings which show very little variation in samples tested from any part of the churn.

During the working-period the barrel travels at 3½ r.p.m., and the butter passes through three sets of rollers at each revolution. It is therefore subjected to the working process 10½ times per minute ($3\frac{1}{2} \times 3 = 10\frac{1}{2}$).

In some churns of the older type the barrel travelled at 1½ r.p.m., the butter passed through one set of rollers twice at each revolution, and was worked three times per minute ($1\frac{1}{2} \times 2 = 3$). The use of the modern type of churn has resulted in the working-period for butter churned at similar temperatures being reduced from forty minutes or over to about ten minutes.

Under the new conditions there is the least possible quantity of water left in the churn, and the conditions are as close to dry salting as possible, while the time allowed for the salt to dissolve is very much reduced. The distribution of the salt is perhaps quite as thorough as before, when temperature conditions are right, but where the churning temperatures have been raised and the size of the butter granule increased, as already described, the time taken to reach the maximum moisture content will be still further reduced, and the working will be less efficient.

(To be continued.)

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Farm Practice and Management.

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Autumn Sowing of Grass-seeds.

WHILE the advantages associated with the autumn sowing of grass-seeds are readily appreciated, it is not so well understood that these advantages may be completely nullified if the seeds are sown under conditions which are unfavourable to germination and growth. In this connection thorough preparation of the seed-bed is essential, and failure to realize the importance of this aspect in the past is responsible for many of the poor and unproductive pastures seen on many farms to-day.

Land may be sown down to grass in the autumn after a summer-grown forage crop, or after roots or poor pasture which has been followed by a summer fallow. While in favourable seasons excellent results may be obtained after a summer crop it frequently happens that the time required for efficient cultivation results in an unduly late sowing, which does not permit of proper establishment before the winter. The alternative is rushed and inefficient working of the land, resulting only too often in an inferior pasture and the ultimate necessity of heavy top-dressing or of resowing.

While the mechanical aspect of cultivation is readily appreciated, the supreme importance of the time element and the necessity of early preparation is frequently overlooked. The following points should be noted :—

(*a*) The land should be clean. Frequent cultivations at intervals are necessary to destroy weeds and their seeds.

(*b*) The soil should contain a reserve of available plant food. Repeated aeration increases the nitrogen content and the available supplies of mineral elements essential for plant-growth.

(*c*) Moisture is frequently a limiting factor. Early preparation allows of moisture being conserved by the opportune use of implements, and avoids the risk of excessive cultivation and exposure in dry weather.

(*d*) Consolidation is essential for clover establishment and to permit of the rise of soil moisture in dry weather. While the roller is beneficial, it tends to consolidate the surface only. Natural deep consolidation requires time.

(*e*) The ideal seed-bed for grass and clover seeds is fine on and below the surface. This is best attained by alliance with the elements and implies repeated exposures of fresh layers of soil over a lengthy period.

Where conditions permit of a summer fallow and where the factor of good management has had full play the seed may be sown with almost complete assurance that even under adverse weather conditions the establishment of grasses and clovers will at least be worthy of the soil.

Sowing of Secondary Burns.

THE sowing of secondary burns on hill country usually takes place in February or early March, and, provided the weather is suitable, the earlier the scrub is burnt and sown the better.

Manuka, bracken fern, and hard fern on hill country are best dealt with first by burning and resowing and subsequently by stocking and top-dressing. Manuka areas should be cut, and, with light scrub, cutting should be delayed until four or five weeks before firing. Hard fern presents difficulties, for it requires a very hot fire to kill the rhizomes; spraying with arsenic pentoxide before firing has been tried and is quite satisfactory but expensive; in dry springs hard fern is often best burnt in spring when the fronds are withered and dry and the patches sown immediately after burning.

The general mixture for secondary burns consists of perennial rye-grass, 8 lb.; crested dogstail, 4 lb.; brown-top, 2 lb.; *Danthonia pilosa*, 3 lb.; white clover, 1 lb.; *Lotus major*, 1 lb.: total, 19 lb. per acre. In logging up burns, or on secondary burns where a good deal of timber is burnt, 4 lb. of cocksfoot may be added to the mixture; on hard country 3 lb. of Chewings fescue and ¼ lb. of yarrow may be added, and the rye-grass and crested dogstail reduced.

The aim of the mixture is to give a quick cover with rye-grass and white clover, thus giving feed to enable bracken to be crushed out with cattle, and, as fertility falls, brown-top, danthonia, and *Lotus major* form a sward. Perennial rye-grass establishes rapidly, and, while there remains a certain amount of ash, throws quite good feed. White clover establishes well, but if the land is not top-dressed it goes out after about three years. Brown-top forms a good and cheap cover. Danthonia is slow to establish and produces very little feed for the first three years. Crested dogstail establishes well and carries on the pasture between the going-out of the rye-grass and the coming in of danthonia. *Lotus major* is slow to establish, but produces well after the third year.

Sheep on Dairy-farms.

DURING recent years the number of dairy-farms on which some sheep are being kept has increased. Such a change in farm economy has aspects that deserve close attention. In some respects the keeping of cattle and sheep on the one farm has distinct advantages. For instance, it is held that certain pasture plants which are neglected by cattle are relished by and serve as good fare for sheep, so that a combination of sheep and cattle in grazing tends to make for the fullest utilization of typical mixed pastures. This was exemplified several decades ago in the classical experiments of Somerville at Cockle Park, England, in which more meat was obtained from an acre of pasture on which sheep and cattle were grazed than from an acre of similar pasture on which sheep alone or on which cattle alone were grazed.

Against this is to be set the fact that in some instances unsatisfactory and disappointing results have been obtained from the introduction of sheep on to dairy-farms. The point of practical importance is that such regrettable results are inevitable if the feed-supply fails either in quantity or quality at critical seasons, and particularly during the winter and early spring. This fact needs to be weighed in conjunction with the further fact that on the majority of dairy-farms there annually are periods of critically low supplies of feed. On such farms if no change in the provision of special feed (feed for use in the winter and early spring) is made, then the introduction of sheep simply makes an already bad position still worse. Field experience shows that the farms on which the keeping of sheep and the keeping of dairy cattle are combined most successfully are almost always, if not always, the farms on which the provision of feed for use in winter and early spring receives more systematic and more extensive attention than it does on the average dairy-farm. When sheep and dairy cattle share an inadequate supply of winter feed two undesirable results are common—the cattle suffer more than the sheep, and the pastures are subjected to an unduly long period of close grazing, which causes a set-back in their vigour, from which they but slowly recover. Summed up, whether it proves profitable to keep sheep on dairy-farms depends, during a period of reasonable stable prices of stock, to a considerable extent upon management, in which feeding is a most important factor.

now! is the time . . .

● Prevention will be found very much cheaper than cure. In most districts worms in sheep, unfortunately, have taken heavy toll, and the wise farmer is adopting preventative measures by starting to drench his lambs at an early age and continuing monthly during the first twelve months of their lives. Drenching ewes twice yearly has also become a paying proposition.

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Lime, Phosphates, and Potash for Top-dressing.

EARLY top-dressing is advisable, for early top-dressing increases the autumn and early winter growth of grass, and thus raises the winter carrying-capacity. Some soils require phosphates only, some phosphates and lime, and other, again, potash in addition to phosphates or phosphates and lime. Farmers in doubt as to their soil requirements should get in touch with their District Instructors in Agriculture. Phosphates, potash, and lime applications are all reflected in clover growth; without clovers grasses do not grow vigorously—the clovers supply the nitrogen essential for grass growth. Typical phosphate-and-lime responses on a lime-and-phosphate-responsive soil are shown in the accompanying illustrations. Figure 1 shows the response for super alone on a red-brown basic volcanic soil in North Auckland, and Fig. 2 the response from super and lime on the same soil. Although it is impossible to ascertain the amount of lime necessary for a soil except by actual field trials, the appearance of the soil profile—*i.e.*, the measure of soil leaching—is a fair guide as to whether a soil will or will not respond to lime. Young soils are not responsive to lime, leached soils are acid, frequently contain toxic amounts of soluble iron and aluminium compounds, and respond to lime. This broad outlook on liming fits in quite well with the lime responses obtained in the Auckland Province. The young soils (volcanic ash showers) of the Bay of Plenty and Central Plateau do not respond to lime, the slightly podsolized soils of the Waikato give a slight response, and the mature podsols and red-brown soils of South and North Auckland show marked lime responses.

FIG. 1.—Superphosphate plot on red-brown soil; two autumn dressings of 3 cwt. super; response fair; sward consists of a little rye-grass, white and subterranean clovers, brown-top, and plantain making poor growth.

FIG. 2.—Superphosphate-plus-lime plot on red-brown soil; two autumn dressings of 3 cwt. of super, 1 ton of lime at laying down, and one autumn dressing of 5 cwt.; response good; good sward of clovers and grass growing vigorously.

Soil Depletion.

THERE are very few farms in the cereal-growing districts that have not felt the devastating effects of continuous cropping, and in many districts there is urgent necessity for a further readjustment of the farming programmes. There is a serious depletion of organic matter in the soils of the majority of the farms, and this is one of the reasons why farmers are in places not obtaining good results from the application of artificial fertilizers.

Soils seriously deficient in organic matter dry out to such an extent that results from fertilizers cannot be reasonably expected. To build up the soil the ploughing-in of blue lupins, clover, white mustard, and also residues of straw-producing crops can be recommended.

Clover in Otago Pastures.

FROM now on until March the sowing of pastures will be receiving the attention of farmers. A few references to the value of including in the pasture mixture good clovers of tested origin will no doubt be helpful.

While the majority of farmers aim to establish their pastures under favourable conditions, much of the good work often falls short of their anticipations through insufficient attention to the clover content. In other words, too much reliance is placed on the natural white clover, which the North Otago District is noted for. When good autumn and winter rains are obtained there is in the following spring a heavy white-clover increase in the pastures, more especially where the field has been top-dressed with super. When the conditions are reversed, however, the natural white-clover increase fails to appear to the extent to which it should, and as a result the pasture suffers accordingly.

In a permanent pasture where red clover or cow-grass is used two years is as long as it usually remains. If no white clover has appeared in the meantime owing to adverse seasonal conditions it is common to find the sward is dominant rye, some cocksfoot, and some white clover and other inferior species which have come into bare spaces. Where the clover content is low the nitrogen-supply to rye is insufficient, and the health of the rye is considerably affected. It is, then, good policy for the farmer to make a point of using a good red and white clover in his mixture at sowing-time. On pastures where attention is paid to the inclusion of good clovers in the mixture better response is obtained when the field is top-dressed with super, while a natural supply of nitrogen will be provided by the clovers. As clovers respond to super the use of certified Montgomery Red and certified white clovers will be more satisfactory, as they are leaf-producers and under suitable treatment will provide grazing for a longer period throughout the year.

Stock-grazing will also return manurial value to the field. The combined factors of good rye, good clover content, the use of super, and the manurial value returned by the stock will assist to maintain a satisfactory fertility which will enable the pasture to thrive and do the stock well. For a two- to three-year pasture the red clover or cow-grass will be sufficient, but the permanent pasture Montgomery Red clover and white clover should be used. In the event of liming requiring to be done it should, if possible, be attended to previous to the sowing of the mixture.

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Soil Moisture.

IT is not often that South Otago experiences a really dry season, but the fact that the majority of farmers are wide awake to the necessity for conserving soil moisture and making it available to the growing swede crops indicate that experience of dry seasons has taught the essential wisdom of the following practice.

At no stage during the numerous cultivation operations is the soil left for any length of time in a loose, open porous condition, as this structure accelerates the circulation of air through the soil, resulting in increased evaporation and consequently loss of soil moisture. All cultivation operations are followed closely by a rolling or clod-crushing, which operation compacts the soil, reduces evaporation to a minimum, and facilitates the action of capillarity, which elevates soil moisture, keeping the soil damp at a slight depth below the surface in a position to be of immediate use in promoting germination and subsequent growth of ridged crops.

Ridging, however, immediately destroys this consolidation, so that it is considered essential to roll the ridges after sowing in order to restore firmness. The essentials aimed at are to decrease evaporation by decreasing movement of soil air, and promote the maximum elevation, by capillary action, of soil moisture, both of which objects are obtained by consolidation.

Grazing and Feed Flavour.

USUALLY a dairy-farmer's first concern in arranging the grazing of his fields is to give his cows the best feed available at the time so that butterfat-production does not drop. Few realize that grazing management at one period of the year may alter the sward and production of the pastures at another period of the year, and that certain kinds of grazing management may change a pasture sward to a marked extent in quite a short time.

An example of what may happen has occurred in the Ruakura Grazing Trials this year. In these trials some fields are winter-spelled (*i.e.*, only leniently grazed during the winter and early spring), and some are winter-grazed (*i.e.*, hard-grazed in the winter and early spring). In the first six months of the trial the winter-spelled fields became very grassy (Fig. 1) and the winter-grazed fields very clovery in production (Fig. 2). Milking was commenced on these trial fields in November. The morning's and night's cream were critically graded for feed-flavour by independent graders who knew nothing about the pasturing of the cows. For November the night's cream from the grassy, winter-spelled fields averaged 1·0 points (0–10 scale) of feed-flavour, while the clovery, winter-grazed fields averaged 2·1 points (*i.e.*, more than twice as much flavour from the clovery fields).

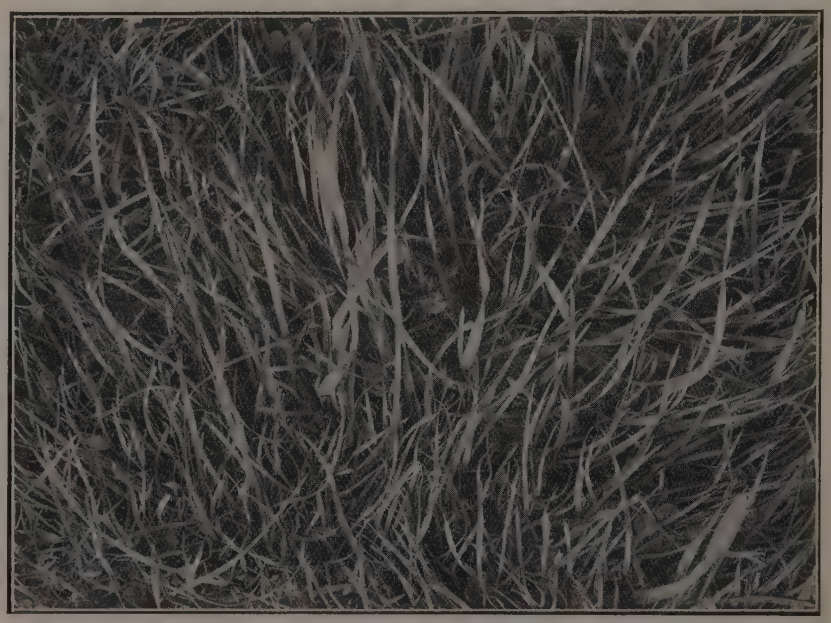

Fig. 1.—One of the grassy, winter-spelled pastures in late October.

[*H. Drake, photo.*

Flavour has been mild this season, but the relative flavour from grassy and from clovery pastures is similar to that of previous years. Feed-flavour can be reduced by adopting the right kind of grazing management in the winter and early spring — this is, only leniently graze (say, from 8 in. to 3 in.) those pastures which are required to be grassy in the spring.

Fig. 2.—One of the clovery, winter-grazed pastures at the same time.

[*H. Drake, photo*

Salt for Hay.

MOST farmers have adopted a standard practice of using 12 lb. to 20 lb. of salt per ton of hay when stacking; the lower quantity being commonly used. The more general and extensive use of salt when stacking hay would be advantageous and 20 lb. of salt (1 lb. per hundredweight) does not appear to be excessive. Salt checks fermentation and overheating. In unfavourable weather damaged hay can be improved in quality by the liberal use of salt; and ½ cwt. salt per ton to hay from those portions of a field where weather damage has occurred will assist materially in improving the condition of the hay.

Salt improves the quality of good hay as well as poor hay. Haystacks should always be protected from the weather; corrugated roofing iron is the most satisfactory; stacks topped off with green material keep the weather out better than when dry material is used for topping.

Pampas Grass in the Manawatu.

MANY attempts to establish small areas of this plant from root cuttings and seedlings have resulted in poor strikes. Growth, except in naturally fertile soils, has in most cases been slow, particularly where the plants have had to compete on clay soils with well established brown-top, cocksfoot, &c. The experience of a Manawatu farmer, Mr. H. Jarvis, of Himitangi, near Foxton, is of interest: Pampas grass was planted first some three years ago on about 2 acres of typical sandy flat country. These sandy flats lying between consolidated sand-dune ridges are not infertile, and moisture is always fairly near the surface. A very poor strike of both root cuttings and seedlings necessitated replanting of most of the area the following year. The plants as they established made fairly rapid growth, two- and three-year plants last winter being about 5 ft. to 6 ft. high and some 1 ft. 6 in. to 2 ft. through.

The area was divided into two, with about an equal number of pampas plants in each On one area forty cows were put out at the beginning of June and were left on the pampas until calving, which commenced about the 20th July. A run off of some 15 acres gave very little help, and a light load of hay daily was not nearly sufficient for the requirements of the cows. The cattle took readily to the pampas, and a very noticeable feature of the stock on the pampas was the excellent coat and healthy general condition and appearance. The last of the cows came off the area about the second week in September, and by the middle of December the best plants were again about 5 ft. high and had stooled out considerably.

The grazing of the other area varied from twenty to fifty head for two months and a half, and the same very satisfactory condition was maintained on the pampas, which was eaten down hard at the end of the period and has since made an excellent recovery. This farmer is satisfied that stock will winter very well on pampas grass and that under his conditions of fairly fertile free draining soil the plants will recover in one year sufficiently to maintain a similar or even heavier stocking. Plants established on a drier sandy knob have not made nearly such rapid growth, and the losses in planting were heavier than on the more fertile and moister flats.

Management of Paspalum in Auckland Pastures.

PASPALUM as a permanent pasture species is of paramount importance in the warmer parts of the Auckland Province. Where this grass is well established the autumn butterfat-production is often equal to that produced in the spring months. In other words, paspalum gives another "spring flush" in the new year.

In order to obtain this, good management is essential; in fact, it has been due rather to bad management than any defect in the grass itself that its popularity has not been greater. Where paspalum is well managed exceptionally high yields, running over 300 lb. butterfat per acre, are not unknown. This management consists of—

(1) Liberal top-dressing to maintain fertility at a high level, so that rye-grass and white clover can grow vigorously.

(2) Good subdivision to permit of rotational grazing.

(3) Regular topping with the mower wherever the grass tends to get out of hand.

Where management is weak the grass soon gets out of hand; in fact, it will dominate a sward in very short time, as its tall, dense growth provides too great a shading effect on species such as rye-grass and white clover. Unless paspalum can be well managed it should not be included in any pasture; but where good management can be practised there is really no soil type, apart from very porous soils, where it could not be included with advantage to the pasture.

A dominantly paspalum sward cannot be improved by cultivation alone. Any such treatment — *e.g.*, disking, severe harrowing, &c.—should be accompanied by the sowing of some rye-grass and white clover to build up the pasture. This work is most satisfactorily performed in the early spring when paspalum is dormant.

Summer management should consist of constant attention to control of growth, and in this connection the mower will be just as necessary as stock.

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Early Top-dressing and Winter Feed.

EARLY top-dressing increases the late autumn and early winter growth of grass and allows of the early winter closing of fields for late winter and early spring feed. The Fields Instructor at Rotorua reports that in May, 1937, he visited a farm of 187 acres in the Putaruru district, where early autumn top-dressing and early closing of fields is the regular practice. The farm carries 100 to 120 milking-cows, and in May 60 acres of the farm were closed for winter and early spring feeding.

Although these pastures were about fourteen years old, they carried an excellent sward and had abundant succulent growth, and resembled young pastures. Hay and ensilage are fed out early before grass-growth stops; and this practice together with early top-dressing allowed of the provision of half an acre of good grass for the late winter feeding of each milking-cow.

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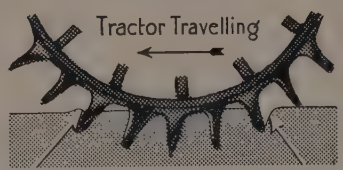

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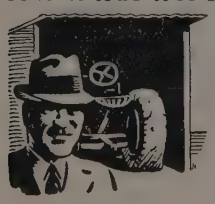
"but they slipped about too much whenever it was wet or boggy" says Mr. Smith.



Mr. Smith prefers to use his tractor all the year round. He found that when his tractors were equipped with tyres partly worn, slipping and sliding were common, and the tractor was laid up for several days at a time. There is no need to keep your Tractor in the shed when it is equipped with McGregor Grips.

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Subterranean Clover Establishment.

IN the southern portion of the North Island (Taranaki, Poverty Bay, Hawke's Bay, and Wellington), excellent strikes of subterranean clover have been obtained by surface-sowing 3 lb. to 6 lb. of seed with 1½ cwt. to 3 cwt. per acre of superphosphate on hill country and poor pastures generally. Some roughage, provided it is not dry and matted at the bottom sufficiently to prevent the seeds easily reaching the soil, seems to aid germination and the early growth of the plants. It is not necessary to harrow or cultivate the surface, and it is considered inadvisable to have the land close grazed before sowing. February and early March sowings have given better results in reseeding the following year than late autumn or early spring sowings. The heavier the seeding the more numerous the plants generally, but a relatively thin strike can be thickened up well by spelling the area in October and early November to allow the runners to develop and spread. The seeds are produced along the runners and are buried as the pods mature, so that the longer and more extensive the runners the more ground will be covered by seedlings the next season.

Where top-dressing results in a fairly strong growth of white clover, as in parts of Taranaki and Poverty Bay, the establishment of subterranean clover from surface-sowing has not been nearly so good as where the annuals, suckling clover or striated clover, take the place of white clover and are the first to respond to top-dressing. The results of surface sowing subterranean clover at an altitude of 2,000 ft. on the Rimutaka clay hill country are shown in the photographs.

FIG. 1.—Rimutaka hill country; elevation 1,000 ft.

Left-hand paddock surface sown with subterranean clover now in its third year, and showing good return of rye-grass and cocksfoot. Right-hand paddock typical weed-infested hill country pasture growing very little feed.

FIG. 2.

Close up of paddock on left showing subterranean clover in the third year, producing well, dominating weeds, and building up fertility.

Close up of paddock on right showing danthonia sward with catsear, daisy, and bidi-bidi.

Weed Eradication.

MANY annual weeds can be got rid of and much good can be done by keeping land clean by cultivation of the stubble immediately after harvest. In many cases stubble land is left more or less idle for some time after harvest and becomes a suitable place for the seeding of many annual weeds.

In some places the stubble is ploughed soon after harvest and in other cases it is harrowed. Under this treatment weed plants are disturbed and prevented from seeding.

Weed seeds in the soil germinate readily after cultivation and can be killed by subsequent working.

Cultivation before grassing Gum Land.

PASTURE establishment on North Auckland gum lands has often been unsuccessful, due in most instances to late sowing after poor and hasty cultivation of the land.

Several practices have been adopted by farmers over the last ten to twenty years, including surface cultivation with disk harrows or a heavy penetrating harrow (tine), one ploughing and sowing after a short fallow, and, more recently, two ploughings and a twelve months' fallow have been adopted with very encouraging results.

From the results of work done on gum land by farmers and the Department of Agriculture it is now considered essential to give this type of land as much cultivation as possible prior to sowing to permanent grass, if a high-producing sward is being aimed at.

Surface cultivation will allow the land to be grassed, but the pastures obtained after this method of cultivation never carry a good sward of high-producing grasses. This method can be described as a cheap, hasty way of introducing grasses ultimately giving a low-producing pasture.

The results obtained from surface cultivation, well done, are, however, always better than the results obtained after poor ploughing followed by hasty cultivation.

The treatment of this land calls for thorough work, aiming at a fine, moist seed-bed consolidated from the bottom up. This is best obtained by ploughing twice; the first ploughing is done during the early autumn as soon as the soil becomes moist enough for the plough to work smoothly. The furrow slices are immediately broken down with disk harrows, followed by further cultivation throughout the winter and spring months as weather permits. The second ploughing is done during October, followed by thorough cultivation throughout the summer months. When this method is carried out thoroughly an ideal seed-bed is obtained which is ready to receive grass-seed at the correct time.

FIG. 1.—Poor establishment of grass on gum land after poor cultivation and late sowing. Sown May, 1937; photograph taken October, 1937.

FIG. 2.—High-producing type of pasture obtained on gum land after thorough cultivation and early sowing.

Farmers who practise this method have no difficulty in establishing high-producing pastures and, although it may appear a costly practice to adopt, it is the cheapest method in the long-run. The land in its original state is cheap to buy; being leached to a high degree is low in humus and fertility. Thorough cultivation, especially during the summer months, appears to put new life into this soil type, and experiences show that it is well worth while going to considerable pains when preparing this land for permanent grass.

In some of the foothill country the feeding of silage to sheep appears to be increasing. Simply mixing good hay with the silage for the first few days and then decreasing and replacing with silage appears a very effective and easy method of getting sheep to take readily to the silage. The silage being made by the sheep-men in question is the light-green sweet type.

Tallarook Subterranean Clover.

MOST of the subterranean clover-seed used in New Zealand comes from Australia, and is of the Mount Barker type. Trials have indicated that Marlborough seed is also of this type. Small supplies of another somewhat later type known as "Tallarook" have been available from merchants during the past two seasons. This variety, with others, has been under trial for several years by the Grasslands Division, Plant Research Bureau, at Palmerston North, and has been favourably commented on.

Tallarook comes away somewhat later in the spring than Mount Barker, flowers about two to three weeks later, but continues growth some weeks later than Mount Barker, particularly in inland districts and where the rainfall in December is good.

Field observations of several areas of Tallarook subterranean clover in the Wairarapa, Hawke's Bay, and Poverty Bay districts indicate also that the main production of leaf is somewhat stronger and more vigorous than with Mount Barker, and this experience confirms the Research Station trials. In several localities Mount Barker and Tallarook have been sown together and the two appear to combine well, the Mount Barker providing the early growth essential to early lambs and the Tallarook carrying on production after the Mount Barker has gone off. Tallarook can be readily distinguished from Mount Barker only at flowering. The characteristic brown marking at the base of each little flower seen on Mount Barker plants is quite absent from the flowers of Tallarook, which are plain white with perhaps a greenish tinge at the base.

Seed of another variety named "Dwalganup" has been on sale in New Zealand, but it is very early flowering and a low producer, and is not at all a good variety for North Island conditions.

Top-dressing Trials in Bay of Plenty.

DURING the past ten years a considerable number of pasture top-dressing trials have been carried out on various soil types in the Bay of Plenty. For the most part the pastures have been average dairying types in the districts where the trials were conducted. In quality they would range from good ryegrass - white- clover - paspalum swards to cocksfoot - fog - suckling-clover - ryegrass - white - clover with the latter species not very prominent. Production per acre would range from 250 lb. to 300 lb. butterfat on the former to perhaps 100 lb. to 150 lb. on the latter type.

The soils for the most part were pumice loams with good drainage, but in a few localities drained peat and river silts were also included in trials.

On all pasture and soil types there has been a very definite improvement from the use of phosphatic fertilizers. Superphosphate, basic slag, and rock phosphate have all brought about a marked improvement in the clover content of pastures, with subsequent improvement in the grass species as well. Superphosphate, generally speaking, has proved to be somewhat superior to other forms of phosphate.

On the majority of trials the response to lime has been disappointing. A few trials, however, have shown slight responses subsequent to heavy applications of lime. In one or two instances this has taken several years to become visible.

As with lime, the general effect of potash top-dressing has been unsatisfactory. The great majority of trials show no response whatever to potash either alone or in association with phosphates. In a few trials on high rainfall country there has been slight improvement from the use of potash, while in one trial a marked improvement has resulted. This latter trial was laid down on the hill country at Katikati.

From work done it would appear that adequate phosphatic top-dressing is the first essential. Whether lime or potash should be used will require some investigation by the farmer concerned, as there appears to be no regularity of response from district to district.

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Fertilizers (1): Rock Phosphate.

NEARLY all the artificial phosphatic fertilizers in use to-day are dependent on rock phosphates for their manufacture, and it is fortunate that numerous deposits occur throughout the world. Such deposits vary extensively in type and quality. The largest deposits occur in America, North Africa, and Russia, while the richest deposits are found on the small islands of the Pacific. All these are what are known as hard rock phosphates. Soft rock phosphates or phosphatic guanos are deposits which may contain a small percentage of nitrogen derived from the accumulated droppings of sea birds and which would ultimately become a hard rock phosphate deposit. In the African and American fields the phosphate occurs as sediments, pebbly or otherwise, mingled with other rocks, and is very variable in quality.

For the present we will consider only Nauru and Ocean Island rock phosphate, which is by far the most important to New Zealand. The origin of these deposits is not quite clear, though it is probable that the reaction of guano and lime coral over countless centuries have produced them. For many years they were unknown, and actually their discovery was an accident. How important this discovery was can readily be understood when one realized that these are the richest deposits in the world and that New Zealand and Australia both have an outstanding phosphate deficiency.

In rock phosphate, phosphoric acid occurs as tricalcic phosphate, often combined with an element called fluorine. Tricalcic phosphate itself is only slowly soluble in water—hence the treatment of rock phosphate to make the more available superphosphate — and the amounts of fluorine present have a marked effect on the availability of phosphoric-acid content.

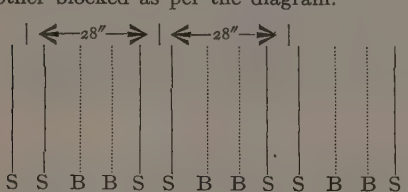
Nauru and Ocean Island phosphates contain from 85 per cent. to 90 per cent. of tricalcic phosphate, which is an extremely high standard for a natural product and equivalent to 39 per cent. to 40 per cent. phosphoric acid. In addition, the amount of fluorine present is small.

The control of these islands is in the hands of Great Britain, Australia, and New Zealand, the two latter countries taking the bulk of the supply. Since the deposits were opened up tremendous improvements have been made in working methods and methods of handling and transportation, until now we have an economic and efficient supply of high-grade rock coming into New Zealand. Over the last eight years the average importation has been approximately 150,000 tons, most of which is used in the manufacture of superphosphate. Its use as a straight and as a mixed fertilizer will be discussed later.

Next month's article will deal with the African rock phosphates.

Sowing of Turnips.

AN interesting method of sowing the turnip crop is to be seen on a farm north of Dunedin. When dry conditions prevail the sowing of the crop on the flat instead of on ridges, provided the land is reasonably free of weed-growth, has certain advantages, and in the instance noticed the crop had been sown through the grain drill, but instead of blocking out coulters in the usual way to obtain row spacing the seed was sown through alternate pairs of coulters with other blocked as per the diagram.



S = Coulters sowing; B = Coulters blocked.

It will be observed that the system allows two drills to be sown in a space of 28 in. (7 in. between coulters) and allows of free tillage by horse implements. The crop was thinned by hoe in the usual way.

A part of the field was sown at the same time on ridges, but the crop on the flat was 100 per cent. better than the ridged part when observed towards the middle of December.

It was thought at the time that had the ridges been rolled after sowing and the soil compacted the crop might have done better, but an inspection of a part where a caterpillar tractor had travelled along the ridges after the seed was sown did not show any advantage. This crop is being kept under observation to note bulb-development.

Seed-certification.

SEED-CERTIFICATION activities for the 1937–38 season are now in full swing. It is too early yet to estimate the total area under certification of the various crops but it is expected that in all crops, with the possible exception of wheat, the acreage entered will be at least equal to that entered for last season.

Considerable progress is being made in the multiplication and distribution of selected and pedigree strains of grass and clover seeds. In the past two seasons it has been found impossible to meet the requirements of those desiring to sow perennial rye-grass and white-clover seed of these improved strains, while the demand which has been experienced by merchants and growers for the first harvest produce of areas sown out with certified Government stock seed is further evidence of the satisfaction of the farming community in regard to the quality of the superior strains which are being raised.

The Department hopes to have available for delivery in June next supplies of certified Government stock seed of the following kinds: Perennial rye-grass, white clover, Montgomery red clover; and farmers desirous of obtaining supplies should arrange for their orders to be submitted through a recognized mercantile firm so that they will be in the Head Office of the Department before the end of May.

The use of lime is becoming a common farm practice, and in nearly all cases the increased production resulting from the use of this relatively cheap commodity leaves no excuse for hesitation in its use. Lime is used for neutralizing the acidity of the soil and creating a condition favourable to the growth of many crops. The physical condition of many soils is vastly improved and the decay of crude organic matter is hastened by lime applications. Legumes are specially benefited by applications of lime, and crops of this nature exert a most beneficial influence on the fertility of the soil generally.

On the heavy soils it is essential that drainage be attended to wherever there is evidence of the necessity for such work. No amount of surface cultivation or fertilizers will give maximum results on a poorly drained soil. There are thousands of acres in many districts where drainage is noticeably deficient. Drainage operations are often expensive, but there is no farm operation that has in the long-run such an influence on crop-production, and often the influence on animal health is most marked.

Section for Irrigation Areas.

Contributed by Officers of the Fields Division.

Necessity for Water.

Low Rainfall Districts.

THERE is no doubt that on land situated in areas of medium rainfall—that is, areas having an average of 20 in. to 25 in. of rain per annum—a system of modified dry farming is either consciously or unconsciously practised. The scope of dry farming is very limited under this system, as it is impossible to farm the land to the best advantage, in that full use cannot be made of fertilizers or lime, and the land has no potential value—that is, it is impossible for the farmer to create an asset which will add to the value of the property. Further, it is subjected to periods of drought conditions which seriously injure stock and pastures. This brings about the necessity of understocking and renewing of pastures.

The value of a cheap and efficient supply of irrigation water for such country cannot be overestimated. No one can deny the fact that the lack of sufficient moisture is the limiting factor on this class of land. One has only to see such land in a season when the rainfall is above the average and visualize the possibilities. This is further enhanced when sunshine (perhaps the most important item in plant-growth) is taken into consideration.

Irrigation ensures that moisture and sunshine are working hand in hand to promote growth. It has much more value than the mere combating of periodical droughts. While there is no doubt that the ensuring of a sufficient supply of feed under drought conditions is an important feature, too much perhaps has been made of it, in that farmers have the idea that this is the sole purpose of irrigation. If irrigation develops on the right lines, this now important feature will dwindle into obscurity.

An average rainfall of 22 in., however well distributed, is insufficient to promote the economic growth of to-day's highly developed strains of grasses and clovers. Couple this with the evaporation caused by drying winds, and production is further limited.

Irrigation by border dyke.

Irrigation must, to be of ultimate economic and national value, develop along the following lines :—

Firstly, to combat periods of drought conditions—that is, to enable stock and pastures to be carried through dry seasons and thus prevent loss through having to sell on weak markets. This must have the result of stablizing prices and preventing speculation.

Secondly, will arise from this the irrigating of pastures to fatten lambs and surplus stock instead of selling store sheep. Farmers will then realize that the dreaded months of drought have ceased to be a menace and will stock up with confidence.

Thirdly, this will mean that the winter period will become the limiting factor, and further land will be irrigated during summer to provide a surplus for winter months.

It will then be seen that pastures are lasting longer, that lucerne and clover thrive under efficient irrigation, and that grassland farming will take the place of "dry farming," and the farmer will have created for himself an asset which before was impossible.

Cost to Farmer.

Applications for Water.

IRRIGATION projects are being developed in Canterbury and Marlborough on a large scale, and in view of this development it would appear necessary that the farmers in these areas should be made conversant with the extent of the schemes, the manner in which they are constructed, the manner in which they are to be ultimately controlled and run, and the farmers' liability.

There is no doubt that much of the opposition met with in the course of construction and development of these irrigation schemes is caused through the lack of knowledge on the farmers' part of their obligations when the scheme is finally completed.

There are five irrigation schemes in Canterbury and Marlborough, covering approximately 200,000 acres. The Levels and Redcliff schemes in South Canterbury have been completed and are in

operation. On both these areas farmers are freely availing themselves and deriving benefit from irrigation water. In the Ashburton County two schemes are in the course of construction, the Mayfield-Hinds and the Winchmore schemes. In Marlborough the Wairau Valley scheme has been surveyed and contoured, but construction work has not yet commenced.

The recent visit of the Ashburton farmers to the Levels and Redcliff areas brought out forceably that the lack of knowledge on the farmers' part was definitely impeding construction and development. A good number of the points raised have been questions asked by farmers, and, further, any one who requires any information regarding these irrigation schemes should write to the Editor, and that information will be given.

Perhaps the most important feature from the farmers' viewpoint is what is it going to cost him—the farmers sole liability in these areas is the cost of the water he actually uses; if he does not use the water, he pays nothing. The cost of the water is as follows: For the first year of operation of the scheme, 2s. 6d. for 2 acre foot of water; for the second and subsequent years, 6s. for 2-acre foot.

An average application of water for irrigation purposes is 3 in. to 4 in. per acre, so that the final cost per acre for application would be about 9d. per acre.

The method of applying for the water is to fill in a card, which is forwarded to the raceman on the scheme.

For the first time or two farmers are puzzled as to how much water to apply for in order to irrigate the intended area. Officers of the Department of Agriculture or Public Works Department will, however, assist them in this.

Water only flows in the races when a farmer is irrigating. Some farmers have the idea that water is flowing all the year round, giving rise to questions of seepage and drainage. Farmers are not responsible for the cleaning or maintenance of irrigation races which run through their properties. Water can be taken out of the races only at the "turnout" provided.

The farmer must construct or have constructed all races and channels on his property for the purpose of getting water on to the land. The "turnouts" are so constructed that they command the farm—that is, they are situated on the highest part of the property.

Every assistance is given to the farmer when he first irrigates. On application the best position for the races will be indicated, and, further, the races will be put in at cost price if he wishes.

Irrigation by border ditch.

The method which has been adopted at Levels is as follows: The intending irrigator applies either to the Department of Agriculture or Public Works Department. The area is surveyed and an estimate of the cost is given. The farmer pays in advance, and the work is carried out, and the farmer is given assistance by the Department of Agriculture in irrigating the first time. With the implements being used the work is done very cheaply. Border dyking costing from 17s. 6d. to £2 per acre; and border ditching from 2s. to 10s. per acre.

Border ditching is the most suitable method for irrigating established pasture. A description of the methods or irrigating will be given in a future issue of the *Journal*.

As before stated, much of the opposition arises from the lack of knowledge on the part of the farmer. Often it appears to the casual observer an impossibility for the water to be taken out of the races and put over the land, but it should be remembered that that is the object of putting the races in.

The idea that the water will not flow in the races, but will simply seep away in the shingle, has been entirely disproved at Levels and Redcliff.

Farmers should keep the fact in view that these irrigation schemes are being carried out for their ultimate benefit, to stabilize the system of farming in countering drought conditions, and to increase the productivity of their properties.

Strike of Root Crops.

MANY disappointments this season have occurred in the germination or strike of mangel, carrot, and turnip seeds. This has been due mainly to the extremely dry spring experienced, causing land that has been worked up and then ridged to become dried out. Frequently with early working and sowing of these crops sufficient moisture is retained in the ridges to germinate the seed. However, where irrigation water is available, it is not necessary and is short sighted to trust to the moisture content of the soil or the prospect of rain to germinate the seed.

The best and most even crops observed this season are those which shortly after sowing received an irrigation in the furrows between the drills, ensuring a moist condition of the soil, an even strike, and the prospect of a good vigorous growth independent of rain.

Haymaking is at present in full swing. The first cut of lucerne is mainly in the stack, while red clover and grass is on the way.

A common practice on the irrigated areas is to irrigate a few days before cutting commences, or, to put it another way, commence cutting after irrigating as soon as the land will carry horses and implements. By the time the crop is in the stack the second growth has commenced to come away vigorously from the moist soil with no, or little, checking or wilting occurring of the bottom growth or young shoots.

In theory this may not appear necessary with deep-rooting plants such as lucerne or red clover, but is sound in practice.

Horticultural Instruction.

Contributed by Officers of the Horticultural Division.

The Orchard.

Seasonal Spraying.

GROWERS are advised that, although the spraying season is drawing to a close, pests and diseases which become prevalent during the late summer and autumn are still likely to do much damage in the orchard, and consequently it is unwise to discontinue spraying while this chance of damage remains. It is much better to be sure than sorry, as many growers have found in the past. Although it may be inconvenient to spray owing to pressure of other work in connection with the harvesting of the crop, &c., it must be remembered that it requires a very small infection of late black spot, a few codling-moth stings, or a slight attack of leaf-roller caterpillar to reduce perfect fruit to the lowest grade, and in many cases to the reject class. At this time of the year in districts subject to high humidity a late infection of pin-head black spot on Dougherty, Sturmer, Statesman, &c., is fairly common when spraying is neglected, therefore growers are advised to anticipate an attack and spray their trees during the present month, and again still later in the season should weather conditions warrant. The same applies to codling-moth and leaf-roller caterpillar, especially the latter, which can do an enormous amount of damage in a very short time. Reference to the spraying programme given in the September number of the *Journal* will assist growers as to what spray to use during the present month. If red mite has not been controlled during the early parts of the season it will be advisable to give the trees a thorough spraying of summer-oil at strength of 1–100, and if the attack is bad an extra spraying of oil within seven or eight days should be applied. Programmes should be arranged so that this spray is not applied within fourteen days of any sulphur spray.

It is possible that stone-fruits will still require spraying with nicotine-sulphate for the control of green aphis, whilst regular sprayings of lime-sulphur or colloidal sulphur should be applied for the control of brown rot, &c.

Harvesting the Crop.

It is anticipated that growers will have everything in readiness for the harvesting of the crop, as advised in last month's *Journal*, so that no time will be lost when operations commence.

Too much stress cannot be laid on the importance of picking. Instructions as to what to pick, when to pick, and how to pick should be given to all inexperienced pickers. Much damage can be done to the fruit by careless picking, and, although it may not be apparent at the time, shows up very definitely before the fruit is placed on the market. Many pickers are apt to pull the fruit off the tree, thus injuring the stem and stem cavity, with the result that the fruit rots at this point. This is specially noticeable with fruit kept in cool store, and means a serious loss to the grower concerned. Fruit of the right maturity easily parts from the spur with an upward movement, and no damage is done either to the spur or the fruit. Fruit of the same size, or as near as possible, should be picked at each picking, leaving the balance to size up for the next and subsequent pickings. If this is done, much time and labour will be saved when grading and packing, and the fruit will be about the same stage of maturity. The stage of maturity at which fruit should be picked depends largely on the market to which it is to be sent. Fruit for export should be picked earlier than fruit required for the local market owing to the greater distance it has to travel and to ensure that it will arrive in the best possible condition. Picking for colour, instead of maturity, especially for export, is apt to be misleading, and may be the cause of some of the "breakdown" reported from the overseas markets. Fruit should be picked at the right stage of maturity, irrespective of colour, and placed in its proper grade, otherwise if allowed to remain on the tree until the high extra fancy colour is attained it may be overmature for the long distance it has to travel. The changing of the ground colour of the fruit, the colour of the pips, and the ease with which the fruit separates from the tree are better guides to the proper stage of maturity for picking than the high colour so often aimed at.

Grading and packing.

To give full details of the operations of grading and packing in these notes would take too much space, but a few of the most important points to remember should not be out of place.

Proper grading, whether for export or the local market, is one of the most important operations connected with the marketing of fruit, and requires a good knowledge of the work by the operator. It requires concentration all the time if the best results are to be obtained. All defective fruit—bruised, diseased, badly russetted, misshapen, skin-broken, &c.—should be eliminated as it passes along the grading-table and before it passes into the bins for the packer. A good eye is necessary for colour grading and to determine the percentage allowed under each grade, so that the fruit can be placed on the proper belt. The grading-table should be kept absolutely clean from any grit or dust collected on the fruit when being delivered to the packing-shed, otherwise scratching of the fruit will be the result. Do not allow the grading-table to become overcrowded, as this tends to bruising, skin punctures, and scratching of the fruit.

Packing of fruit is an art in itself, and requires much experience before one can become expert. Quite a number of important points are to be remembered when fruit is being packed, and it is only by a strict observance of these points that a correct pack can be secured. The ultimate aim should be to secure a "tight" pack with a sufficient "bulge" to ensure that, after the usual shrinkage has taken place, the fruit will arrive at its destination in a "compact" condition. This can only be obtained by uniformity in the size of the fruit being packed, using the proper pack for that size, and consolidating the pack as the case is being filled, thus firming the fruits in their respective "pockets."

The consolidation of the pack as each layer is put in the case will help to equalize the bulge at top and bottom. All the fruit should be wrapped with a pad of paper underneath, this acting as a cushion to prevent bruising should any undue pressure be necessary when lidding. When the packed case is finished, the fruit at the ends of the case should be from ¼ in. to ½ in. above the ends, and the fruit in the centre of the case from 1½ in. to 2 in. above the sides of the case.

Much responsibility rests on the person nailing down the case to see that the fruit is not damaged—especially at the ends—when the lid is being put on. He should also reject any cases that are packed too high or too low.

The neatness with which the wiring, labelling, and stamping is done not only gives the case a good appearance, but often helps to create a good impression on the buyer.

Further reference is made to the hygienic conditions of the packing-shed, without which no fruit can be expected to reach its destination in good condition. Advice given in last month's notes in the *Journal* should be attended to. No reject, rotten, or diseased fruit should be allowed to remain in or around the packing-shed, and all parts of the machinery should be regularly cleaned to ensure that the chance of fungal rotting is reduced to a minimum.

—George Stratford, Orchard Instructor, Motueka.

Citrus Notes.

Importance of Humus.

NO amount of fertilizers applied to citrus trees will compensate for lack of humus in the soil. Where it is possible to grow green crops, this method of supplying humus is usually the cheapest. Leguminous crops are recommended for this purpose on account of the nitrogen which is gathered from the air by such plants and stored in nodules on the roots. In most districts blue lupin, sown at the rate of 2 bushels per acre, will make an excellent cover-crop, although in certain soils white lupin appears to be more suitable. Other legumes suitable are vetch, tares, and peas. Recent trials in the Gisborne district with purple vetch as a cover-crop gave promising results. To obtain the best possible growth the seed should be sown in February after the soil has been brought to a fine tilth. The crop should then be ready for ploughing in during June or early July. The ploughing-in of green crops late in the spring is detrimental to the health of the trees, and should be avoided by early sowing.

Where there is a risk of the green crop seriously interfering with picking operations it is a good practice to sow every alternate land only—the following season the other lands should be sown. The practice also avoids considerable damage to the green crop while the fruit is being harvested. In older groves it is sometimes difficult to grow a satisfactory crop of green material between the rows owing to the spread of the trees. In such cases it is necessary to consider the advisability of growing a green crop such as lucerne or clover on adjoining land, which can be cut several times during the season and used to form a mulch around the trees. The inducement to use the space between young trees for revenue-producing crops, to the detriment of the supplying of humus, should be avoided. Farmyard manure of any kind is of immense value to citrus trees, and where available should be applied in large quantities.

Tobacco-culture.

A Growing Industry.

THE production of tobacco on commercial lines has been practised in the Nelson district since 1917, and has of late years reached an annual output of approximately 1,500,000 lb., which was absorbed by the manufacturing tobacco companies operating in New Zealand.

In 1934 the crop produced was in excess of the requirements of the manufacturers, with the result that growers' contracts and areas were reduced. Growers then approached the Government for assistance to open up an export trade with Great Britain. This was finally arranged on a guarantee basis, the Government guaranteeing the tobacco-growers 1s. per pound upon all tobacco graded, accepted, and packed in tierces for export. This money was distributed at the completion of the packing season and advanced to the growers through the agency of Messrs. Buxton Ltd., of Nelson and Motueka. This firm organized the growers, provided the buildings and equipment necessary, paid the wages of the workers engaged in the reconditioning of the graded leaf, arranged and paid the oversea freight, &c.; the remaining portion of the advance was paid to the exporters of tobacco. Any money received from the sale of exported tobacco in excess of the amount advanced to be paid out to the growers on the grade value of tobacco supplied.

The Government provided the services of the Tobacco Instructor free of charge to supervize the grading for export and all details connected with the correct handling of tobacco to ensure it opening up to the best advantage in London.

Export Trade.

The tobacco export business has been conducted satisfactorily for the past three years and has relieved the local market, the prices secured giving more confidence to the growers and establishing the fact that New-Zealand-grown tobacco is acceptable on the London market.

In 1936–37 the consignment price received averaged 2s. per pound and was composed of nine grades for which the price received ranged from 2s. 6d. to 1s. 3d. per pound. This price compared favourably with that paid for other Empire-grown tobacco for that season.

In October, 1937, the Government authorized the purchase of a Proctor re-ordering machine for the better handling of the export tobacco. This machine is now in the Motueka district, and arrangements for the building of premises are under way. The new installation will be in operation this coming season.

The Tobacco Instructors of the Department of Agriculture have recently been transferred from Auckland to Motueka to give assistance to tobacco-growers requiring advice and help, and particularly to attend to the growers who are producing tobacco for export.

There are about five hundred tobacco-growers farming in the Motueka-Nelson district, which embraces Tadmor in the south-west to Sandy Bay in the north-east; of these, ninety-one are growing tobacco for export.

It is noticeable that there are various changes from the methods recommended by the Department twelve years ago, when growing leaf for export was first undertaken; and, in my opinion, these changes are largely responsible for disease now so prevalent in the crops.

Seed Germination.

Prior to 1926 all tobacco-seed was germinated in beds by the farmer on his own farm, with very varied success, so much so that it was impossible to marshal the crop or set any given date for operation.

The Department of Agriculture demonstrated the method of having all seed germinated in glasshouses owned by proficient nurserymen, who distributed the seedlings to farmers throughout the district at a given date. New Zealand, as far as is known, is the only tobacco-producing country to adopt this method.

The farmers pricked these seedlings out in nursery beds 4 ft. wide by 12 ft. long, covered with a hinged hessian or scrim lid. These beds allowed easy and quick access to the plants both for watering, weeding, and hardening off. Then, when grown to the planting-out stage, the bed was lifted by sliding a spade 3 in. to 4 in.

below the surface and lifting the plants without any root injury. The planting was done without manure. This manure was added afterwards when the young plant had become established.

To-day the practice is to prepare beds which are 36 ft. to 48 ft. long, with close-woven calico covers securely fastened to the wooden frames. These beds are not easily uncovered, and it is difficult to give the plants the required attention. They were forced along too quickly and are consequently less hardy, with the result that the plants are ready in many instances before the field is properly prepared; then, because certain plants in the long bed are more advanced than others, these are pulled, breaking some rootlets off and scoring others. These damaged plants are often planted in rows that have been manured two days previously. Under such treatment plants are more liable to infection of certain diseases present in the soil.

The method formerly advocated twelve years ago, the open-work, scrim-covered nursery bed, was slower in producing a 4-in.-high plant, but the plant was harder and healthier. Lifting the whole 12 ft. by 4 ft. bed at one operation destroyed any backward, small, worthless plant, but you had an even run of upwards of two thousand five hundred good, sound plants per bed. The small bed is a little more expensive to construct and maintain annually, but the produce from it is more acceptable, being hardier, sturdier, and more resistant to disease, and is more in demand by farmers generally.

Another matter that requires careful treatment is seed production. A tobacco-plant produces upwards of two hundred and eighty seed-pods, but only a limited number of these will reproduce as good a specimen as the parent. Plants that commence to sucker before the seed-head or flower-bud are formed are degenerate, and probably have been gathered from the wrong portion of the seed-head. Many tobacco-plants in Motueka are showing this tendency.

Seasonal Notes.

There has been particularly favourable weather for the planting-out of tobacco in the Motueka district, with the result that there is a good "take" of young plants in the fields, and growers are busy cultivating the crop. Occasional heavy rains have had a beneficial effect, and the crops promise well.

Mosaic disease is very prevalent, and in some plantations has caused upwards of a 20-per-cent. loss. To date visits of instruction have been paid to many growers during the present growing season.

—Charles Lowe, Tobacco Instructor.

Viticulture.

Glasshouse Conditions.

WHEN the early varieties are picked, all ventilation should be left open and the vines allowed to grow freely until the lower temperatures of winter cause the vines to become dormant and the leaves to fall.

Although an occasional bunch of grapes may be cut for show purposes with the piece of the lateral on which it is growing, this should not be made a regular practice. Such a practice robs the vine of much of the foliage necessary for developing good strong buds required to produce the following season's crop.

Where it is decided to allow ripe grapes to hang on the vines for future use, the glass should be covered with blinds or painted with clay or limewash. The grapes lose their flavour and general condition if exposed to the full light of the sun when once ripe. Covering the vinery before the grapes are ripe retards the ripening, which is undesirable in the case of grapes grown for sale, which are mainly of the Black Hamburg variety. The ideal in districts where outdoor table grapes thrive is to produce grapes that ripen before the outdoor varieties are on the market, and late grapes which can be marketed after the outdoor-grape season is over. The favourite late grape grown under glass is the Gros Colman, which should be grown in a house by itself, as it requires somewhat different treatment to early varieties. Like the Madresfield Court, it is apt to crack under too moist conditions or after heavy rain following dry soil conditions. To avoid cracking, the treatment should be modified as soon as the grapes begin to colour. More ventilation, including bottom ventilation, from then on should be given, and watering inside the house should be suspended. Borders should, however, be kept moist. A sharp look-out for cracked or diseased berries should be a daily duty, and all affected berries carefully cut out.

A common trouble, particularly noticeable in the Auckland District, is Grey-rot (*Botrytis cinerea*), which is due to too moist and confined atmospheric conditions.

Work in the Vineyard.

In slashing off the superabundant foliage from the vines, care should be taken to avoid damaging the young rods grown to replace the old rods next winter. These young rods should be trained along the top wire, as far as they will grow. No stopping should be done. The slashing or topping of the foliage, where necessary, should be done fairly frequently, so that too much foliage and wood will not have to be cut off in any one operation. There is a tendency, especially among vignerons who have grown grapes under glass, to leave too little foliage on the vines. Outdoor vines require at least a dozen leaves above the grapes to feed them, and the bunches should be well protected by foliage from the direct rays of the sun.

Cultivation should be confined to the top 2 in. of soil, which should be kept in a fine state of tilth. Weeds should on no account be allowed to grow, as these rob the vines of necessary moisture in the soil and retain a humid stagnant atmosphere round the vines, both conditions which are unfavourable for the production of sound ripe grapes.

Cellar.

In the cellar, all materials to be used in the coming vintage should be thoroughly overhauled and cleaned. Vats and barrels should be filled with water to make sure that they will hold the wine. Hoops should be tightened, and repairs executed where necessary.

Should there be any suspicious odour indicating an unfavourable condition in the wood such as mould or vinegar flavour, soak with water to which ½ oz. of permanganate of potassium (Condy's crystals) has been added to each 36 gallons. Rinse, and if there is still some odour fill up again with water and half the amount of crystals. Finally rinse, and sulphur two or three times.

—J. C. Woodfin, Vine and Wine Instructor, Te Kauwhata.

A very effective method of lighting oil-burners for frost protection is employed by a number of Hawke's Bay growers. A torch consisting of a piece of pumice up to the size of a clenched hand is fixed on the end of a strong wire. When soaked in kerosene it will burn for about half an hour. Lighting is done by sprinkling a little benzine on the surface of the oil and then touching it with the lighted torch. Ignition is instantaneous. The benzine is carried in a cordial bottle, being of handy size, and an inexpensive sprinkler is fastened in the end. The type of sprinkler used is a light aluminium one made to fit this size of bottle and sold by most departmental stores at about 4½d., and are generally used in the household for sprinkling linen with water before ironing. Several torches and bottles of benzine should be kept in readiness.

Vegetables, Small Fruits, and Flowers.

Contributed by the Horticultural Division.

Tomato Crop.

Control of Pests.

THE harvesting of the outside tomato crop is well under way during the month of February, and the harvesting of the crop under glass is usually drawing to a close. So soon as it is finished the house should be thoroughly cleaned and the land sown down or planted. Any delay not only exhausts the soil unnecessarily, but permits fungous plants and insect pests to increase and become more firmly established. Under any system of intensive cropping probably the most important single factor on which success depends is cleanliness. Especially is this the case under glass where the same crop is grown annually: one is invariably dealing with infectious diseases of a more or less serious character, and the usual precautions should be taken and the cleansing very thoroughly carried out.

Just what these diseases and pests happen to be will be best known to the one who has had charge of the house and has been supplying its requirements. They will doubtless include the leaf-mould fungus *Cladosporium fulvum*, which usually makes its appearance towards the end of the harvest period, if not before. It is chiefly for the destruction of this fungus and its spores that sulphur is burnt in the house when closed up tight during a windless evening. The sulphurous-acid gas given off when burning sulphur is a powerful fungicide, and concentrated in a closed house it will destroy most insects with the exception of those in the soil. The sulphur is burnt at the rate of 2 lb. for every 1,000 cubic feet of air space in the house, and to obtain good diffusion without delay it is burnt in several heaps well spaced out over the floor of the house.

Painting of Houses.

In preparation for this treatment the plants may be cut off a few inches above the surface of the ground and allowed to hang in the strings. When the gas has done its work and the vines are reasonably dry, ventilate the house, cut down the plants, and carry them out with the strings and burn them. The interior of the house is then well brushed down to remove webs and dust, and washed to remove dirt and slime and improve the lighting. Repairs to timber and glass should then be made, followed by painting the woodwork and lime-washing the walls.

Where the range of houses is extensive, the work and cost may be distributed by painting certain houses each year so that each receives a coat every second or third year. A good stone colour is most serviceable outside and a good white-lead paint inside. If there are any hot-water pipes in the upper portion of the building, they may be given a coat of aluminium paint, otherwise a coating of paint made of lamp black and turpentine to which a small proportion—not more than a fourth part—of linseed-oil is added. Walls of brick or concrete should be well brushed down and given a dressing of lime-wash made from quicklime in which two bottles of kerosene and 4 lb. of salt are well stirred into a bag of lime while it is slaking. It will then neither flake or rub off when dry. As an alternative, a little cement may be added to the lime-wash and a 4 in. pot of sulphur to each bucketful. By keeping houses in good repair insects and disease have little opportunity of becoming established, and drips and leaks, which are such a common cause of injury to crops and depreciation of buildings, are avoided.

The roots of the tomato crop should be lifted, carefully examined, and carried out to be burnt when sufficiently dry. This process, together with the experience of the past season, will give one a very good idea of the state of the soil and its requirements. If stem sterilizing or a change of soil is not required, light cultivation may be given and the land sown down in a green crop for turning under later.

If the propagating-house and potting-shed are now given a thorough overhaul as outlined above, there will then be less trouble with the young plants in this department. The stocks of soil, manure, leaf-mould, &c., which are being cured in preparation for the seed-boxes should now be turned and mixed at intervals with a view to aerating the materials and destroying insects and fungi which they may contain.

Cabbage Sowings.

An important showing during the month of February is cabbage for spring cutting—varieties such as Flower of Spring are tender and of good quality. In warmer districts a firm cabbage such as Succession is usually sown, as they are more suited to the climate. A thin sowing of lettuce for late cutting should be made and allowed to mature without transplanting. Salad onions, radishes, spinach, silver beet, carrots, and turnips are also sowings which may be made now.

A case of black-rot disease of cabbage, *Bacterium campestre*, was observed recently. This is, as the name states, a bacterial trouble, for which spraying is of little use for the purposes of control. Blackening of the veins of the leaves and a brown or black ring of tissues revealed when a cross-section of the stem is made are the more conspicuous symptoms. Ploughing-in infected stumps and other material or tossing them in a heap to decay on the headlands are most effective ways of spreading the trouble. As all cruciferious plants are liable to attack, this trouble may easily become serious unless care is taken. Crop rotation should be carefully observed, infected material destroyed, and care taken to see that infection is not carried from the field by men, horses, or implements. The trouble may be seed-borne, and if there is any doubt regarding the seed it should be washed in corrosive sublimate.

Small and Sundry Fruits.

When what pruning may be required at this season has been done, brakes of bush fruits should be given a dressing of manure and fertilizers, which should then be ploughed under. The depth of the ploughing should be carefully adjusted after consideration of what has been customary and the depth of the soil. In any case, it should not exceed 6 in. at

this season in established plantations. For raspberries, red currants, and gooseberries the potash ingredient is important and should receive special consideration; the sulphate of potash is preferable for these fruits. Where farm manure is not available, the land may be sown down in a cover-crop for turning under about the month of July.

The preparation of the land for new plantations of bush fruits should be pushed ahead so soon as it is cleared of the crop of the present season. A rich soil, deeply cultivated and quite free from bad perennial weeds, is what is required. Unless it is thoroughly clean, planting should be deferred for another season; these heavy-cropping plants will not flourish when in competition with serious weed troubles. Every care should be taken to secure well-rooted plants of moderate size for planting out.

Raspberry-canes are probably the most difficult stock to buy. It is important that the canes planted are from a young plantation; canes taken directly from old exhausted stools are unsuitable for planting out a new field. After a selection has been made, the order should be given for delivery so soon as possible, which generally will be about the month of May. The plants on arrival should be carefully heeled in, and then planted out permanently as soon as weather and other circumstances permit. The sooner the better. As regards varieties, it is best to plant chiefly what has proved itself in the locality, but also a few plants of other varieties in good repute with a view to giving them a trial under local conditions. In raspberries a comparatively new variety known as Lloyd George has rapidly made its way into favour in so many localities that it may be given a trial anywhere on good land. Such fruits are generally best planted not less than 6 ft. between rows so that cultivation and other operations can be carried out easily. On heavy land with strong growing varieties another foot or two between rows will not be too much. Between plants in the row the distance may be closer; raspberry-canes are sometimes planted singly 1 ft. apart in the row, but 18 in. is close enough, and 30 in. is not too much for vigorous varieties such as Lloyd George.

Black currants also may be planted rather close in the row, 3 ft. being often quite sufficient. Gooseberries and red currants require more air. For the first season some intercropping may be done. Cabbage and salads, potatoes, and peas may be grown so long as the welfare of the permanent crop is carefully safeguarded. Good evergreen shelter on the south side is usually required, and protection from westerly winds is also sometimes a necessity. An important requirement also is moisture during the summer months when the berries are being harvested. Land which dries out at that period will not carry good berry crops unless irrigation can be practised.

Strawberry Culture.

A moist soil during the summer months is also a requisite for successful strawberry culture. In a light soil that often dries out at that season the grass-grub will take many of the plants, in spite of almost any economic treatment. Under almost any other conditions they crop well, and it is often a wonder that there are not more planted. The reason doubtless is often due to the disappointing results obtained after setting out inferior or unsuitable plants. It is important the plants should be of a variety which has proved itself suited to the locality—they have unaccountable preference in that respect. They must also be not only clean and healthy, but of good fruiting strain of that variety. They must also have good natural vigour that is not due to the use of fertilizers. The runners should be grown directly, not on old stools which are carrying a crop, but on strong young plants from which the blossoms are picked. Selected old stools with a good cropping record make excellent mother plants for building up a stock, but the vigour must be built up by giving them a rest from cropping.

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In all but the warmest districts strawberry-plants should be set out so soon as the plants are ready now. The preparation of the land may usually be completed by ploughing under a liberal dressing of blood-and-bone manure, superphosphate, and sulphate of potash, and harrowing down moderately fine, followed by occasional light cultivation to destroy seedling weeds. When the land is clean and settled firm, planting may be done. This may be accomplished by drawing light furrows with a marker and planting along the lines by means of a plough, grubber, or trowel. In exposed positions double rows are sometimes planted with a view to developing the matted-row system, but more often a single row method is the most suitable. In warm districts where the planting is done annually the spacing is rather close—9 in. to 12 in. between plants and 24 in. to 27 in. between rows. Where cropping is carried on over three seasons or so, especially with vigorous varieties, 14 in. to 16 in. between plants and 30 in. or even 36 in. where horse implements are used is not too much between rows. The plants, handled carefully, should be set firmly and rather deep.

The Homestead Garden.

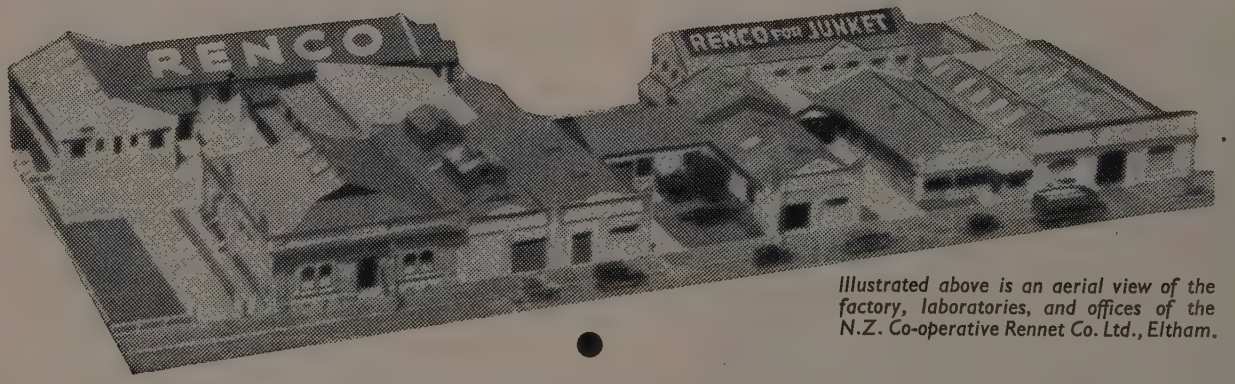
It is now time to make a commencement in carrying out plans made for new gardens or alterations to old ones, so that lawn-grass seed may be sown during the months of February or March and all may be ready for planting trees, shrubs, &c., towards the end of the month of May. Established trees and shrubs which have to be cleared should be chopped off neatly at the surface of the ground, or sometimes it is an advantage to dig them out altogether.

The preparation of the land for lawns and borders is very similar to that required for other crops. That it should be thorough is important, as these crops are permanent and little more than top-dressing may be applied later. Another point requiring special attention is the grades and levels of the finished surface of the ground. There should be no haste in deciding just what they should be or lack of care in carrying out the decisions afterwards. These factors have much to do with the appearance of the garden, but, most important of all, by adequately disposing of all surface storm-water the health of the plants and the comfort and convenience of the inhabitants is greatly increased. In forming the drive and paths, grades and levels should receive the same consideration so that all storm-water is drained off quickly without any scouring. A little expenditure on culverts and drainage will usually be found more economical than repairing the wear on a badly drained road surface.

Grass-seed Bed.

When the formation work is completed, it should be given time to consolidate, and in about a fortnight, when seeds near the surface have had time to germinate, it should be lightly hoed in fine weather. If this is done once or twice the land will be clean and firm, which are the conditions necessary for a good strike of grass-seeds. When the final adjustments to the surface have been completed by alternate raking and rolling, grass-seed should be sown during a windless period, at a rate of about 1 oz. to the square yard, immediately following with a mixture of superphosphate and sulphate of ammonia in equal quantities at the same rate. Seeds and fertilizers are then raked in smoothly, and nothing more is required until the grass has grown an inch or so long, when a light roller should be used. If this work cannot be done during the time mentioned, it should be deferred until about the month of August. In the drier localities these periods are of special importance; in more humid districts more liberties may be taken in that respect.

THE LARGEST RENNET FACTORY IN THE WORLD.



Illustrated above is an aerial view of the factory, laboratories, and offices of the N.Z. Co-operative Rennet Co. Ltd., Eltham.

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ELTHAM.

Most kinds of garden hedges in good condition may be trimmed with advantage during the month of February, when they will retain their appearance for a maximum period. Hedges which have been neglected and require heavy cutting are generally best dealt with in early spring.

Books of travel are always interesting and frequently contain useful references to plants and crops. A gardener travelling recently in Norway writes: "Florists' auricula and a perennial lark-spur remained the most popular and the most successfully grown border plants, almost the only ones left as the Arctic Circle was passed. Nowhere have I seen such voluminous clumps and such luxuriant umbels of auricula (*Primula auricula*) as in the small garden of Tromso and cemetery at Hammerfest. A few fine clumps of *Primula veris* and *P. elatior* were noted. . . . . The only soil available in these towns consists of pure peat, which forms a thin layer over the highly metamorphic rocks of this coast, none of which gave indication of containing carbonate of calcium." Too often those who are managing a garden in the cooler districts feel they are working under a disability and spend a great deal of time trying to rear tender plants and crops, failing altogether to recognize the fact that their conditions are ideally suited to the production of many crops which will not thrive in warmer localities. The facts quoted above are only a few of the very many instances where such is the case. The really successful garden, wherever it may be, is only made where this principle is observed under all circumstances. There is hardly any locality but what has outstanding advantages in this respect, and they should be fully exploited.

—*Wm. C. Hyde, Horticulturist, Wellington.*

Extracting Season in the Apiary.

E. A. EARP, Senior Apiary Instructor.

BY this time, provided weather conditions are favourable, extracting will be in full swing in all districts. There may be two or more extractings during the season, or the honey may be left in the hives till the close of the flow and the whole crop removed at one time. In the latter case the beekeeper needs an ample supply of supers and combs, and must watch attentively that the hives do not become honey-bound and the bees commence loafing. The better plan is to have two or three extractings during the season, removing at the first operation all combs in which the honey is wholly or three-parts sealed. When these are emptied and returned to the hives the excluders should be brought into use if they are not already in the hives.

Hot sunny weather should be chosen for the work, as on such days the honey runs freely and the bees are good-tempered. A good plan is to remove the honey in the morning, stacking the supers in the honey-house as they are removed, preparatory to extracting in the afternoon. By this method all stray bees can be removed before the actual extracting commences, and the operator can work quickly and peacefully at emptying the combs till the evening, when the empty combs can be returned to the hives. By the morning the bees will have settled down and returned to the task of refilling. "Keep the extractor running" is a good maxim once the work has commenced, and every hot day should be utilized for gathering the harvest.

Removing Honey from Hives.

Honey should not be removed from the hives until it is well ripened. When the surfaces of the combs are a half to three-parts capped, the honey is usually sufficiently ripe to enable the beekeeper to extract with perfect safety. In northern districts the practice of taking off "green honey," to be afterwards ripened in the tanks, has been to some extent carried out, but the humidity of the climate must be the deciding factor. In southern districts such procedure would be dangerous, and care should be exercised and only well-ripened honey taken. By taking unripe honey, fermentation will often result, rendering it unfit for consumption. When the time for extracting is at hand the usual practice is to remove the combs one by one, and to brush or shake off the adhering bees. As the combs are relieved of the bees they should be stacked in the super, to be afterwards removed to the honey-house. It is a wise precaution at all times to place a cloth over the combs in the super, and if there are any signs of robbing it is a good plan to use a damp cloth which has been previously immersed in water containing a small percentage of carbolic acid.

Use of Strainers.

Some form of strainer should be adopted to catch the larger particles of wax, dead bees, &c., in the honey as it leaves the extractor and before it finally reaches the tank. It is a simple matter to strain the honey, and yet this important part of the work receives less attention than its importance demands. It should be the aim of every beekeeper to see that his product is rendered as marketable as possible before it finally reaches the customer, and thus create a name for a high-class article. Wax is not a component part of honey, and dead bees are foreign matter, and yet they are frequently found in honey exposed for sale. Honey containing either is not likely to suit the buyer, and its selling-value is consequently reduced. To ensure that all but the smallest particles of wax will be removed the honey should be run through a fine wire strainer, and finally passed through fine cheesecloth before entering the tank. Cheesecloth strainers are cheap and are easily made, and should be cleansed after each day's operations. The strainers should be of such construction as to be easily cleaned, and if the cloth is tacked into wooden frames the operation is generally facilitated. Use cold water when cleansing the strainers: hot water melts the particles of wax, thereby clogging the holes in the cloth; whereas cold water removes all wax from the surface. Hang the strainers up to dry, so as to be ready for use when required.

Honey-tank.

No part of the apiary equipment is of more importance at extracting-time than a good tank. From the strainers in use it is advantageous to run the honey into a tank, so that the small particles of wax that pass through the strainers will rise to the surface, when they can be skimmed off before finally drawing the honey off at the bottom of the tank. Many beekeepers run their honey direct from the strainers into tins and small packages ready for sale, with the result that the small particles of wax rise to the surface, to the detriment of the honey and its sale. Frequently complaints are made as to the quality of the honey, and not infrequently adulteration is suspected through an excess of these wax-particles rising to the surface. Such honey should not find its way to market, its condition having been brought about by sheer neglect on the part of the beekeeper to provide adequate tank accommodation. By allowing the honey to settle in the tank the air-bubbles escape, the small particles of wax rise to the surface, and in dry weather surplus water is evaporated. The size of the tank to be adopted must be decided by the beekeeper himself, as it is hard to find two beekeepers with requirements alike in the matter of honey-tanks. He must study his needs and convenience, but, in any case, the tank should hold enough to enable him to deal with the honey in the hives at the time of extracting.

Cleanliness essential.

It should hardly be necessary to point out that the greatest care must be taken in preparing honey for market. However, it is by no means an uncommon thing to come across cases where the beekeeper appears to have lost sight of the fact that honey is a food, and, what is of more importance, a food which is eaten uncooked. Too much stress cannot be laid on the fact that everything in the honey-house should receive the same attention as dairy utensils. The extractor and tank cannot be washed out every day during the season, but they should be thoroughly scalded before commencing operations, and whenever honey is allowed to remain in them they should be covered with clean washing covers. These cost little, are easily made, and should be very much in evidence throughout the season. On no account should bees, flies, dust, or other foreign matter be allowed to alight on the honey in the tank, and as soon as extracting is finished for the day the extractor should be closely covered with a cloth. Finally, as a fitting close to the day's work, the floor of the extracting-room should be washed, and every drop of honey spilt during the day removed.

Treatment of Foul-brood.

The work of putting colonies under treatment where foul-brood is detected should not be postponed. The season is a short one, and every effort should be made to winter only clean hives. The risk of having the disease spread by robbing during the off-season, when it is most likely to break out, will lead to endless work in the spring unless the beekeeper is in earnest in checking its spread during favourable conditions. No better plan can be followed than to treat all infected colonies by the McEvoy method during the late flow. Many beekeepers are too ready to postpone treatment, only to find in the spring their hives weak in bees, and consequently in poor condition for successful treatment. No half-measures should be adopted when dealing with foul-brood, and in all cases the "double shake" should be practised if the disease is to be entirely eradicated. A good plan to follow if any doubt exists as to the complete absence of the disease is to mark all infected colonies, and to leave them to be finally dealt with after the clean colonies are extracted. In any case, the combs should be marked with the number of the hive to which they belong, so that when they are extracted they may be returned to the colony from which they were taken. If these precautions are taken the risk of spreading disease by means of wet combs is minimized.

Sows on Lucerne.

A MANAWATU farmer has been grazing part of his lucerne stand for the past three years with breeding-sows and is satisfied that it pays. On 47 acres he milks thirty-three cows, with a butterfat production between 10,000 lb. and 11,000 lb. Last year eight sows were grazed continuously on a small area of lucerne with no other feed whatever, and have done remarkably well. The sows are taken off the lucerne to farrow and are put back immediately the litters are weaned. The sows maintain excellent sleek condition on the lucerne, and good healthy litters are produced. The whole of the skim-milk supply is available for the sows with litters and the growing and fattening pigs.

A number of litters are sold as weaners, and the net returns last season from the eight sows was £130, or just under 3d. per pound of butterfat. While the area of lucerne cut for hay and given the usual management of a lucerne stand in the district is much cleaner and free from grass, the area on which the pigs are grazed has been invaded by a good deal of grass, but the lucerne continues to thrive despite this competition. The grass provides the main source of feed during the winter and early spring.

CANTERBURY AGRICULTURAL COLLEGE

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LIVE-STOCK:

Studs of the following breeds are maintained:—

Sheep: Corriedale, Southdown, Romney Marsh, English Leicester, and Border Leicester.

Pigs: Large White, Tamworth, Large Black, and Berkshire.

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Inquiries relating to admission of students and sale of stud stock should be addressed to
PROFESSOR E. R. HUDSON, Director.

Fees: Diploma Course, £52/10/- per annum. Degree Course, £55 per annum.

Poultry-keeping Section.

The Growing Stock.

EVERY care should be taken with the developing stock, as experience has shown that the best and most profitable birds are amongst those that have been raised from chickenhood to maturity without a check. Environment plays a very important part in the development and future production of pullets; they must be contented if the best results are to be obtained.

It is necessary to see that ample shade is provided so that the birds can get shelter from the heat of the sun and also to see that they have access to shady places to eat and drink, for unless such places are available birds will often go hungry rather than get into the hot sun to feed. Where natural shade is not available some temporary artificial shade should be erected, and it will be of advantage if such shelter can be so made to enable its removal to fresh ground from time to time.

On a general farm where only a few broods of chickens are reared each year it is always well to see that the young stock are raised on fresh ground, and if reared in coops they should be moved regularly. The young birds will enjoy the change, and it is wonderful what a difference such little extra attentions make in the future life and usefulness of stock. Especially is this noticeable when chickens happen to be rather late hatched.

Moving Pullets.

Many of the early hatched pullets will be laying by this time and should be in their permanent quarters. All pullets should be moved before they start to lay, otherwise the change of quarters is likely to upset them and bring on a false moult. Pullets nearing maturity should be handled with extra care, for at that stage they are usually very nervy, easily frightened, and perhaps injured. When moving them from the rearing to permanent quarters they should be handled with great care. A well-ventilated box or catching-crate should be used. It is a dangerous habit to carry pullets by the legs with the head hanging down, for many good birds have been injured in that way. The correct way to carry a bird is to catch both legs firmly, place the bird under the arm with the keel resting on the palm of the hand and the head behind you.

If the moving is done with care at night there is much less chance of upsetting the birds. The laying-houses should, of course, be thoroughly cleaned before placing the pullets in them.

Scratching-material.

The correct use of litter in the laying-sheds is an important item in house-management. Where birds are kept on the intensive system it is advisable to arrange matters so that the litter will be well broken up and a good depth of fine, dry scratching-material is in each laying-shed before the damp season arrives; if this can be done and the houses are not overcrowded the litter is more likely to remain dry throughout the winter.

Before moving in the pullets place about 3 in. or 4 in. of dry straw evenly over the floor, and as this gets broken up a little more may be added until there is about 4 in. of fine, dry scratching-material on the floor, which not only provides the necessary amount of exercise, but makes the house warm and confortable during the winter.

As birds usually face the light in order that they may see the grain when feeding, the result is that the litter soon gets scratched towards the back of the house; this should be forked forward regularly.

Where no dropping-boards are used it is advisable to see that some grain is thrown under the perches in order to encourage the birds to keep the litter stirred up under the perches. It is also advisable to fork the litter out towards the front of the house at least once a week. A little attention to these details will often mean the difference between success and failure of the no-dropping-boards system.

Dampness in Houses.

If a good winter egg-supply is to be obtainable dampness in the houses must be avoided, and now is the time to correct any weakness.

The two chief causes of dampness in houses are moisture from the floors and moisture caused by condensation.

The first is usually the result of want of proper drainage on the floors being lower than the outside ground. The continuous cleaning-out of houses and failing to put in fresh earth often causes a seepage from outside, care should be taken to see that proper drainage is provided. In places where good drainage cannot be had it is a good plan to dig a hole at the back of the house and fill it up with stones or coarse material so that any surface water may drain away and so help in keeping the floors dry.

The second cause of dampness in houses is due to condensing of atmospheric moisture and is really the result of overcrowding and insufficient ventilation.

When birds are kept on the intensive system at least 4½ square feet floor space should be allowed each bird; one or two birds in excess in a house will cause the floor to be damp during the winter.

The sheds should be well ventilated, but draughts must be guarded against. The great importance of an abundant supply of fresh air in poultry-houses is being more and more realized by poultry-keepers. It is vital to good health.

House only Good Pullets.

A weakness to be seen on many poultry plants is the failure to cull pullets. Only strong, healthy, good-constitutioned pullets are likely to be profitable. Any weedy, weakly specimens should be culled as soon as possible, for such birds are a danger in a plant, as they are susceptible to any trouble that may be about.

Even if one has plenty of room for such birds it will pay much better to give the extra room, feed, and attention to fewer and better pullets. As a rule late-hatched or weakly birds do not come into lay till winter is over, and then they do not lay sufficient eggs to pay back what they have cost to rear before the moulting season comes round.

When possible it is a good plan to grade up the growing stock periodically. Experience has shown that better results are obtained when pullets are kept in flocks of not more than fifty.

As there is no way of telling the age of hens it is a good plan to leg-brand pullets when they are moved into the laying-houses, and where hens are to be kept for a further period an extra band should be placed on them, and a good time to do this work is when the birds are being culled and the breeders selected.

Care of Incubators and Breeders.

Now that the hatching season is over, if not already done, all incubators, brooders, and brooding equipment should be thoroughly cleaned and, if necessary, any repairs made, before being stored away till required next season. The incubators should first be brushed out and then given a good scrubbing with soap and hot water to which some disinfectant has been added. Leave the doors open till the machine is thoroughly dry. All kerosene and wicks should be removed from the lamps and the burners and lamps given a good cleaning. If the regulating rod and arm are unscrewed and placed inside the incubator they will be safe and less likely to get bent or knocked about than if left in position during the off season.

—C. J. C. Cussen, Chief Poultry Instructor.

N.Z. Federation of Young Farmers' Clubs (Inc.).

Edited by S. Freeman, Dominion Organizing Secretary.

To Young Farmers' Club Members:—

COMMENCING with this issue the *New Zealand Journal of Agriculture* becomes the official organ of the New Zealand Federation of Young Farmers' Clubs. This is a matter for self-congratulation among club members throughout the Dominion, and is intensely gratifying to your Dominion President, to the members of your Dominion Executive Committee, and particularly to myself as your Organizing Secretary. The offer by the New Zealand Department of Agriculture to provide space for the Young Farmers' Club movement in this *Journal* is a tangible proof that the value of the work being undertaken and carried out by the clubs is recognized by those who are in a position to gauge its usefulness to the farming community and to realize the vast potentialities of the Y.F.C. movement, together with its immense national importance.

The *Journal of Agriculture* itself will be an asset to every young farmer, and it is hoped that these pages will prove of definite worth to the Y.F.C. movement and actually become, as it is intended, the New Zealand Young Farmers' Club magazine. This section will be devoted to matters of particular interest to club members, and in addition to containing general news of the clubs in all parts of the Dominion, it is hoped to make it a medium for the exchange of thought and ideas among the club members themselves. The assistance of members and of those intimately associated with the movement is solicited in order that this section may be worthwhile. Already a number of contributions in the way of short articles on matters of farming interest have been promised by individual club members, and photographs of local and general subjects, and "snaps" of club activities will be particularly acceptable. Suggestions from clubs and individual members will be welcomed, and with their co-operation and assistance it is certain that these pages will become one of the most interesting and important sections of the *Journal of Agriculture*.

Kindly address all correspondence to—

S. Freeman,
C/o Department of Agriculture.
Private Bag,
Wellington, C. 1.

Young farmers judging stock.

Stock-judging Event.

Team for Australia.

THE success attending the Y.F.C. stock-judging competitions at the Royal Show, Palmerston North, on 5th November last is convincing evidence that the Young Farmers' movement in New Zealand is firmly established. The gathering together of over one hundred members from all parts of the Dominion for the purposes of the competition is an achievement in itself, and the fact that the major part of the sum required to send a team of representatives to Australia was contributed through the competing clubs is an indication of the spirit that prevails throughout the organization, and a tribute to Y.F.C. members themselves.

Competitors judged in four classes as follows: Romney sheep, Jersey cows, Clydesdale horses, and baconer pigs. There were 101 members taking part in the competitions, comprising 31 from the South Island and 70 from the North Island. Some competitors entered for more than one class, making 203 individual entries. The awards were as follows:—

CLASS I.—ROMNEY EWES. 63 ENTRIES.

(Judge, Mr. J. G. DONALD, Featherston.)

(1) A. Fisher, Carterton.
(2) J. McLaren, Martinborough.
(3) N. W. Clarke, Woodlands.

CLASS II.—JERSEY COWS. 69 ENTRIES.

(Judge, Mr. M. D. MURRAY, Woodville.)

(1) H. McKenzie, Carterton.
(2) A. Johnson, Cardiff.
(3) K. W. R. Mitchell, Woodville.

CLASS III.—CLYDESDALE HORSES. 38 ENTRIES.

(Judge, Mr. A. E. COOK, Christchurch.)

(1) A. Viles, Apiti.
(2) A. Revie, Crookston.
(3) J. S. McKay, Masterton.

CLASS IV.—BACONER PIGS 33 ENTRIES.

(Judge, Mr. E. P. NIELSEN, Manawatu.)

(1) A. Cowan, Apiti.
(2) D. Rowland, Kairanga.
(3) E. W. Garnett, Alton.

The competitors' score-cards are being returned to them, through their club secretaries, with a copy of the judge's report in each case.

It was decided at a recent meeting of the Dominion Executive Committee that the winners of the four classes should undertake the Australian tour. As the Australian Junior Farmers' Clubs Organization has now asked that a team of *five* Y.F.C. members should be sent from New Zealand, and there were no South Island representatives among the winners, the South Island members of the executive were given the task of selecting the fifth member. Their choice fell upon Mr. C. Whatman, of the Waihaorunga Club, South Canterbury, who is one of the original club members in the South Island, and is also a Young Farmer delegate on the Dominion Executive.

It was certainly a coincidence that the winners of the four classes were two members from each of two clubs, Carterton and Apiti, and although it might have been hoped that the awards could have been wider spread, the winners have well and truly earned their awards, and the good wishes of the other competitors will go with them overseas.

The team to tour Australia is as follows: A. Fisher and H. McKenzie (Carterton Y.F.C.); A. Viles and A. Cowan (Apiti Y.F.C.); C. Whatman (Waihaorunga Y.F.C.).

It is anticipated that the New Zealand team will leave Wellington by the "Awatea" on 8th February, going by rail from Sydney to Adelaide and arriving there on the 13th. After touring South Australia they will return from Adelaide to Sydney by sea. They will be conducted through New South Wales, the tour concluding with a week at the Royal Show, Sydney. It is expected that the New Zealand members of the party will return to Wellington on 19th April.

One obligation on the part of the team will be the keeping of concise but comprehensive diaries, from which an account of the tour can afterwards be written up. On account of the short space of time available it has been found impossible to draw up and submit to each country concerned a set of rules for an international contest so as to give all teams an equal chance. In view of this the Australian authorities have decided that no International Judging Competition will be held on this occasion. Members will, however, be able to enter the Students' Judging Competitions conducted by the Royal Agricultural Society at the Sydney Show.

In connection with the Judging Competitions at Palmerston North full credit should be given to the Manawatu Y.F.C. District Committee; the idea of holding the competitions and of using them as a means of providing the nucleus of the fund to send a team to Australia emanated from that committee. In addition to this the whole of the work directly connected with the running of the competitions and the billeting of visiting members was carried out by the officials of the Manawatu Committee. Visitors and friends were entertained by the committee at a smoke concert during the evening before the judging competitions took place, approximately one hundred and seventy Y.F.C. members and friends being present.

The results of the other Y.F.C. competitions held at the Royal Show, Palmerston North, are as follows:—

N.Z. JERSEY CATTLE-BREEDERS' CHALLENGE SHIELD (for teams of three members each, drawn from Young Farmers' Clubs):—

(1) Woodville.
(2) Kairanga A.
(3) Levin A.

Eleven teams entered for this contest.

Y.F.C. SHEEP-SHEARING COMPETITION.

(Judge, Mr. E. W. BARNETT, Halcombe.)

(1) R. J. Brown, Kimbolton. 143½ points.
(2) M. Lange, Shannon. 139 points.
(3) G. Mitchell, Kairanga. 138 points.

The competitors were allowed one trial sheep and two competition sheep, the awards being made on time, style, and finish. The popularity of this type of competition is indicated by the fact that twenty-two entries were completed, and had time permitted a further ten or twelve members would have entered the contest.

Among the Clubs: Reports on Activities.

Otago and Southland.

Arrowtown.—An interesting club debate was held, the subject being "Tractor *v.* Horses." This was followed by an instructive talk by Mr. M. McIntyre, Live-stock Division, Department of Agriculture, on the bruising of sheep and lambs. At the previous meeting Mr. W. S. Reid gave an interesting and educational talk on his recent trip to Australia, describing his journey from Sydney to Brisbane and back, via Tamworth, to Sydney.

Clinton.—Lecture by Mr. A. F. Greenall, Department of Agriculture, on seed certification.

Dipton.—Lecture and demonstration on the care and get-up of wool, by Mr. C. McKenzie. At the previous meeting Mr. A. Stuart, Department of Agriculture, gave a lecture on grasses and manures.

Duntroon.—Arrangements finalized for club dance. Mr. R. Stringer, Oamaru, gave an address entitled "Gleanings from the Grasslands Conference."

Enfield.—Three-minute talks by members on different subjects. The monthly competition for the best idea on the farm resulted as follows: J. Buzan, first; A. Anderson, second.

Five Forks.—A very constructive address was given by Mr. Edgar Ewing, a member of the club. Mr. Ewing gave a detailed account of his recent trip to Australia and his tour of the North Island on his return. Mr. Ewing's address was well delivered and was of great interest to his fellow club members. The Five Forks Club is one of the first four clubs formed nearly five years ago, and Mr. Ewing is one of the original members.

Lawrence.—Talk by Mr. J. M. Rose on his recent trip to England and the Continent.

Milton.—A lecture was given by Mr. Christie on farm shelter and afforestation.

Palmerston.—The lecturer for the evening, Mr. Craig, voluntarily postponed his talk to enable members to see the New Zealand Pig-marketing Association's film on "Pigs and their Diseases," dealing with pleurisy, peritonitis, necrosis, and various other diseases affecting pigs and their marketing. The film was exhibited by Mr. Stubbs, and at the conclusion he was warmly thanked by Mr. J. Lowan on behalf of the club members.

Papakaio.—A talk was given by Mr. W. Daig on his trip to Japan; this proved very interesting and instructive.

Roxburgh.—Mr. Arnold Bain, who was the club's representative at the recent Stock-judging Competition at the Royal Show, Palmerston North, gave a very interesting talk. He mentioned that there were twelve in the party from Otago and Southland, and that on arrival at Palmerston North they were met by local club officials, who had made billeting arrangements. On the evening before the competitions the Manawatu District Committee entertained the visitors and local supporters at a smoke concert, about one hundred and seventy being in attendance. The chairman for the evening was a local club member, and associated with him were the District Committee President (Mr. H. J. Lancaster), the Mayor of Palmerston North, the local Member of Parliament,

officials of the Manawatu Agricultural and Pastoral Association, officers of the Y.F.C. Federation, and representatives of the Department of Agriculture. Mr. Bain was greatly struck by the able manner in which club members handled the speeches that were allotted to them; in this connection they compared quite favourably with the older and more experienced speakers at the function. Commenting on the judging competitions, Mr. Bain said that it was rather unfortunate for southern members that a different standard was apparently adopted in the North Island, and it was rather difficult to follow the official judges in some of their work. As an example, he stated that they appeared to favour a coarse-woolled Romney, whereas in the South a finer-woolled Romney usually found favour with the judges. They also appeared to give more attention to carcass points and attached less value to the wool. In the Clydesdale section the animals used were not up to the standard seen in most South Island shows. However, the members from the South thoroughly enjoyed the trip and felt that much valuable information had been gleaned. A further matter that impressed the Otago lads was the progress being made by the clubs in the North Island, and they were unanimous in their appreciation of the manner in which the club officials and members at Palmerston North had looked after them. At the conclusion of his address Mr. Bain was accorded a very hearty vote of thanks. A lantern lecture was given by Mr. J. M. Smith, Fields Superintendent, Department of Agriculture, entitled "The Growing of Malting Barley." At the previous meeting a lecture was delivered by Mr. Lloyd-Williams, Department of Agriculture, on "Frost-fighting in Orchards."

Thornbury.—A committee was set up in connection with a decorated lorry for the Thornbury Y.F.C. on the occasion of the Riverton Centenary Celebrations. Mr. McKenzie, of Messrs. Wright, Stephenson's, Ltd., gave a very interesting talk on wool, including wool-rolling, classing, and baling. At the previous meeting Mr. Harris, Fertilisers (S.I.), Ltd., gave a lantern lecture on pastures. An interesting field day was also held, with an attendance of seventy-three, comprising fifteen local club members, eight visiting members, and fifty farmers and other friends. The field day took the following form: a review of the Thornbury experimental plots (grasses and clovers, &c.); a demonstration of a Howard rotary hoe; and a Romney Sheep-judging Competition for members, Mr. Sands being the judge and demonstrator.

Young Farmers' Club exhibit at Carterton Show.

Upper Clutha.—At the annual field day of the Upper Clutha Club, held on the Wanaka Showgrounds, Pembroke, there was a good attendance of club members, while a number of farmers and others were also present. This field day takes the form of a competition for the J. S. Hunt Shield, club members being "put through their paces" in connection with their knowledge of live-stock and agricultural matters. The competitors on this occasion had to judge two Romney ewes and point out the good and bad points of a Clydesdale filly and a Friesian cow, and were also expected to name the species in a collection of twenty-six grasses. The judges were Messrs. W. R. Gawn (horses), C. Gawn (sheep), T. Smith (dairy cow), and G. G. Calder (grasses). This year's winner was Mr. S. Kane, who held the shield last year, this being his second consecutive win. The judges commented on the keenness of the competitors, and stated that the standard of work generally, showed an improvement over that of last year. On behalf of the club Mr. W. A. Scaife (president) presented Mr. Kane with the J. S. Hunt Shield, and congratulated him on his win. He also expressed the club's thanks to the judges and to Mr. Morrow, of Wanaka Station, for his assistance. Mr. J. M. Smith, Department of Agriculture, commended the club for its progress, and paid a tribute to the club officials, Messrs. W. A. Scaife (president), S. Kane (chairman), and A. Allison (secretary), to whom much of the club's success was due.

Upper Waitaki.—Lecture by Mr. T. A. Sellwood, Department of Agriculture, on clover in pastures. A successful field day was held in the Hakataramea Valley, commencing at about 10 a.m. at "Cliffside," the property of Mr. A. C. McCaw. Members were conducted by Mr. T. A. Sellwood, Department of Agriculture, over the various trials laid down of subterranean clover, barley, wheat, &c. Lunch was partaken of in Messrs. J. and F. McCaw's orchard. Hakataramea Station was visited, the manager, Mr. Parsons, giving an interesting and instructive outline of what had been accomplished on the station. Stock and plant were inspected, and the party adjourned to the homestead, where afternoon tea was dispensed. Mr. Atkinson (club president) expressed the members' appreciation and thanks to Mr. Parsons for his demonstrations and also for the hospitality extended; he also thanked Mr. Selwood for his valuable review of the experimental work.

Waitaki-Hilderthorpe.—An interesting account was given by two club members of their recent tour of Australia as members of a party of New Zealand farmers.

West Taieri.—Club members joined with the W.D.F.U. to hear a talk by Mrs. Kerr on her travels in Europe.

Woodlands.—A field day was held on Mr. Geo. Stevenson's property at Dacre. Mr. Stevenson spoke on the preparation of the woolshed prior to shearing, and the handling of the wool from the sheep's back; he also gave a demonstration on the skirting and rolling of fleeces.

Instruction in the case of shearing and machines, including the grinding of combs and cutters, was given by Mr. H. Turnbull. Shearing classes were conducted throughout the day with both machines and blades, the instructors being Messrs. H. Turnbull and J. G. Smith. A demonstration of bloodless docking and castration of lambs was also given.

Canterbury.

Amberley. — Lecture by Professor Hudson, Lincoln College, on farming in Australia. At the previous meeting a debate was held between the club and the farmers' union. The subject was "That Wheatgrowing is of Benefit to the Country," the club team, which took the affirmative, being declared the winner.

Ellesmere.—Address by Mr. L. Morrison, Lincoln College, on the insect pests of pastures.

Darfield.—Talk by Mr. J. R. Cullen on his recent trip to England and various places in Europe. A successful field day was held at Courtenay, twenty club members and a number of interested farmers being present. Subterranean-clover paddocks on Mr. J. D. Henderson's farm were inspected, and Mr. A. E. Joseph demonstrated on a pen of fat lambs, showing how to pick a fat lamb, and indicating the points that count for show purposes. It is of interest to note that this club has inaugurated a Stacking Competition to be open to Y.F.C. members, with entry fee of 2s. 6d., the winner to hold a challenge cup for the year.

Ladbrooks.—Address by Mr. J. H. Calder (Lincoln College) on "Changes in Agriculture, Past and Present." Following his address Mr. Calder gave some very good advice regarding the conduct of meetings.

Springston Hall. — Debate by club members, the subject being "That the Contract System of Threshing is Better than using Private Threshing Machinery." The affirmative was taken by Messrs. T. Hamilton, C. Tyson, L. Burt, and R. Harris, and the negative by Messrs. S. Burt, W. Barrett, G. Reid, and C. Wallace. A social evening was recently held by the club, the entertainment being provided by items rendered by club members, quoits and table tennis matches were also arranged.

Teddington. — Addresses by Messrs. W. C. Miller and G. Templeton on "Pig-recording Clubs and their Objects." It is understood that, following discussion that took place during the meeting, the formation of a pig-recording club in the district is well under way. At the previous meeting three members of the club—Messrs. J. Burson, E. Streeter, and S. Blatchford—gave talks on their impressions of the Dunedin Educational Week.

Nelson.

Motupiko.—Wool-classing demonstration and talk on the manufacturing processes of wool by Mr. F. R. Berryman, and a shearing demonstration by Mr. S. Meads. At the previous meeting members took part in a general discussion on supplementary cropping, including the growing of potatoes, turnips, swedes, rape, lupins, peas, and clovers, and crops grown for green manuring. The fertilizers used were also discussed. This club is to be commended for its efforts to develop the social side; arrangements are in train for card parties and draughts tournaments; the club is also giving assistance to the W.D.F.U. Socials.

Moutere.—Discussion regarding the recent club dance. A talk was given by Mr. Kemp on a Romney demonstration held at Mr. Jordon's home at Hope, and attended by some of the club members.

Manawatu.

Halcombe.—Talks by club members: Potato-growing (Mr. J. Gloyn) and England To-day (Mr. T. Mason).

News!

Arrival of the 1938

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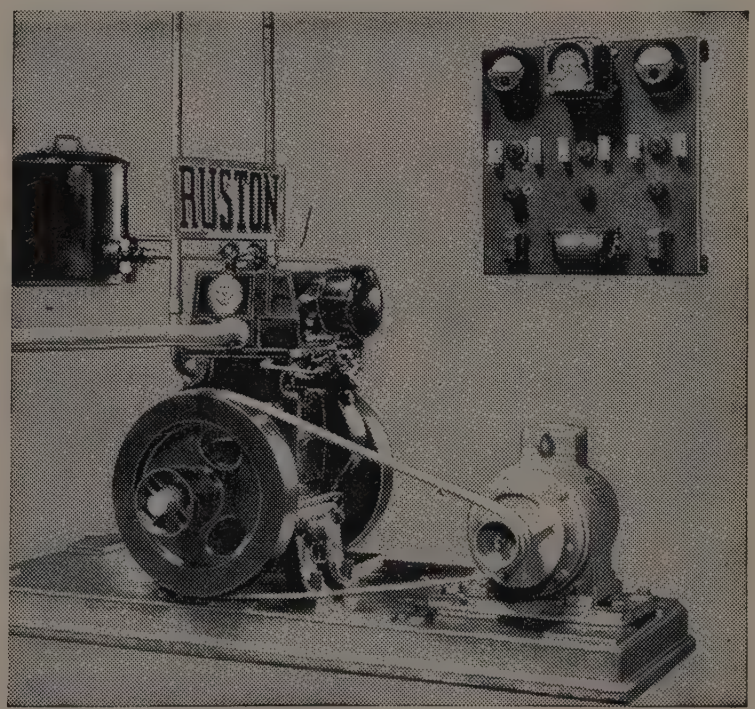

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Kairanga.—A lecture dealing with the merits of the tractor compared to horses was given by Mr. D. Mildon, a club member, many interesting points being raised. A general discussion on subterranean clover and pasture management was led by Mr. A. J. Galpin, Department of Agriculture. A proposal regarding Y.F.C. blazers was brought forward at this meeting, and referred to the Manawatu District Committee. At the previous meeting a lantern lecture was given by Mr. E. A. Madden, Grasslands Division, Palmerston North.

Levin.—Screening of a film dealing with caterpillar tractors, by Messrs. Gough, Gough, and Hamer.

Kimbolton-Kiwitea.—Lecture by Mr. P. G. Sterns, of Feilding Agricultural High School, entitled "Diseases of Animals." The speaker dealt with contagious abortion, internal parasites of sheep, and other troubles, and a very interesting discussion ensued.

Otaki-Te Horo.—Address by Mr. H. B. Lethbridge, Otaki, on farming costs. A field day was held recently on Mr. W. J. Galloway's property at Otaki. Mr. G. S. Robinson, Department of Agriculture, demonstrated on experimental plots, and dealt with trials of subterranean clover, strains of white clover and rye-grass, also palatability trials and seed mixtures.

Paraparaumu. — Lectures by visiting members from the Otaki Y.F.C. as follows: "The Identification of certain New Zealand Wools" (Mr. M. C. Holmes), and "The Care of the Flock" (Mr. J. Galloway).

Wairarapa.

Ballance.—General discussion on pigs. Address by Mr. P. G. Cope, Palmerston North, on farm accountancy.

Carterton. — Resolution passed condemning the publishing of an article in *Progress* entitled "Young Farmers' Clubs at the Crossroads." Short talks, as follows, by club members: "Care of Farm Implements" (J. Milne); "Lime Kilns and Quarries" (L. Hopkins); "Rearing of Calves" (S. Rose).

Greytown.—Lantern lecture by Mr. N. Lamont, Department of Agriculture, on the certification of grass-seeds. At the previous meeting a lecture on grain and produce was given by Mr. R. Hills, who extended an invitation to the club to inspect the seed-cleaning plants, &c., in Masterton.

Mangatainoka.—A New Zealand Perpetual Forests film was screened by Mr. Spencer; the film dealt with the growing of *Pinus insignis*, &c., and created a lot of interest.

Masterton.—Mr. W. F. McLaren, Dominion President, presented the club with a Challenge Cup donated by *Point Blank* for stock-judging competitions in the Wairarapa. Mr. J. Coom, a club member, gave a detailed account of his recent trip abroad, comparing farming in New Zealand with farming in England, Scotland, Northern Ireland, and the Continent. Another member, Mr. K. Donovan, gave a talk on the Foxton Woolpack Factory.

Taranaki.

Alton.—Lecture by Mr. A. J. Illingsworth on "Cheddar Cheese, and the London Rural Mills Supply." At a previous meeting five members gave short talks on various farming subjects, and Mr. L. S. Clark, Patea, delivered an address on the British Navy and its value to the nation. A very successful field day was also held at Mr. H. J. Foreman's piggeries.

Cardiff.—Interesting talk by the club chairman on genetics.

Pukengahu.—Lecture on troubles in horses by Mr. Leslie (Veterinary Surgeon). At the previous meeting an impromptu speech competition was held, and was won by Mr. H. Kirk.

Toko.—A debate was held, the subject being "Ensilage *v.* Root Crops." The speakers were as follows: G. Anderson, J. Lister, J. Sorgeson, B. Anderson (root crops), and H. Ancell, T. Boyce, S. Corley, R. Needham (ensilage).

Wanganui District.

Hunterville. — Lecture by Mr. Hill-Motion on sheep and their diseases, followed by a short talk on horses.

Waimarino.—Lectures by Messrs. H. Mountfort and A. Read (club members) on "Lucerne in Areas of relatively High Rainfall." At the previous meeting Mr. A. Hammond gave an address on herd-testing.

Hawke's Bay.

Dannevirke.—A club has been established at this centre, and a very successful meeting was held recently at which the club officials were elected. This club has started well with a membership of about forty.

Onga Onga.—A lecture on seasonal troubles in cows and sheep was given by Mr. A. D. M. G. Laing, Government Veterinarian, followed by valuable discussion. At the previous meeting an instructive address on the manufacture of woollen goods was delivered by Mr. W. Leach, of Springfield.

Poverty Bay.

Gisborne.—Mr. R. Matthews (a club member) gave a very interesting and detailed talk on his experiences in England with the Coronation Contingent from New Zealand, dealing particularly with the Smithfield Meat Market. Mr. W. L. Cooper (also a club member) gave a short address on Southdown sheep. At the previous meeting an able address by Mr. W. S. Emmett on parasites in sheep was followed by an interesting talk on the Argentine by Mr. T. Y. Ceaser.

Nuhaka.—A paper was read by Mr. J. Crombie (a club member) on herd-testing. Lestures were given by Mr. Small on the life-cycle of an animal taking advantage of nature, and Mr. Tod on the breeding of run cattle.

Ruatoria.—Lecture by Mr. R. F. Bould on Stock Acts and noxious weeds. Mr. Forster, of the South British Insurance Co., gave a talk on insurance in general. At a previous meeting Mr. Lee, Government Grader, gave an address on the grading and exporting of butter; and Mr. Irving, a member of the Tolaga Bay Y.F.C., gave a talk on rotational grazing.

Te Karaka.—Arrangements finalized for the club's annual ball. Mr. W. S. Emmett gave an instructive lecture on worm infestation of sheep.

Wairoa.—An address by Mr. T. Jessup, "Farming in the Argentine." The speaker made special reference to beef raising, comparing the methods in the Argentine with those in New Zealand. Mr. Jessup was heartily thanked for his interesting talk. The speakers in the five-minute prepared speeches for the Powdrell trophy were Messrs. C. O. Mackay ("W. D. Lysnar"), J. Hodgson ("Sir William Perry"), Brian de Latour ("Lord Bledisloe"), and J. Brownlie ("John McKenzie"). Mr. C. O. Mackay was adjudged the winner after a very close contest. This competition will be concluded at the January meeting, and the final contest of all winners will be held in February. A series of impromptu debates will be commenced at either the February or March meetings. The Wairoa Club at present holds the record for the biggest membership among the Young Farmers' Clubs in New Zealand; the club has now eighty-six financial members.

Bay of Plenty.

Edgecumbe.—Mr. R. Strachan, the club's representative in the Y.F.C. judging competitions at the Royal Show, Palmerston North, gave an interesting *résumé* of the competitions. Mr. W. A. McCracken gave an instructive talk on hay and ensilage making, based on practical experience.

Kati Kati.—An interesting lecture on sheep management was delivered by the advisory president, Mr. Capamagion. The club chairman, Mr. G. B. Walford, gave a summary of his efforts in the Royal Show Stock Judging Competitions.

Paengaroa. — Discussion *re* debating competitions. Mr. G. Williams, the club's representative, gave a talk on the judging competitions at the Royal Show, Palmerston North. At the previous meeting an address on the pig-recording-club movement in New Zealand was given by Mr. D. G. Beattie.

Te Kuiti.

Te Anga.—Arrangements finalized for club dance, and also visit to Nelson's Apiary, Otorohanga. A general discussion took place at this meeting, members relating their experiences regarding sickness and diseases in dairy and other cattle.

Otorohanga.—This is a recently formed club, and appears to have every prospect of success. It is hoped to have more news of this club in time for next issue.

Rotorua.

Horshorr.—A successful field day was held on Mr. A. Solomon's property; the main feature was a demonstration by Mr. Leash (Dairy Inspector) on the cleaning of milking-machines, and general cow-shed hygiene.

Ngakuru.—This is a newly formed club. Prospects appear very bright in this district and when work begins in earnest, no doubt some very excellent reports will be coming in.

Putaruru.—Arrangements for field competitions were finalized. An address was given by Mr. G. McGowan on the breaking-in of horses. At the previous meeting members had the pleasure of listening to a talk by Mr. W. J. Baldwin on "Farming in England."

North Auckland.

Kaitaia.—Arrangements finalized for a visit to Moerewa Freezing-works and for a field day at Waiharara. Mr. Moss, Department of Agriculture, addressed the meeting on the judging of dairy cattle. The Kaitaia Club has the distinction of being the farthest north club in the Dominion, and although its membership is comparatively small its members are particularly keen.

Marohemo-Maungaturoto.—A field day was held on Messrs. Trewin Bros. property at Marohemo. The assembled members were addressed by Mr. N. Fergus, club chairman, and by Mr. F. Trewin. Mr. T. H. Hankin, M.R.C.V.S., Government Veterinarian, gave an instructive talk on the functions of the various organs of the dairy cow. He then conducted a post-mortem on a cow infected with tuberculosis. Various ailments of cattle were dealt with, among them being lumpy jaw, the symptoms and treatment being described. Mr. E. H. Arnold, Department of Agriculture, has laid down several manurial trial plots on club members' farms recently; these will, no doubt, provide valuable material for field days on future occasions.

Cover Design.

THE cover of this *Journal* was the inspiration of Mr. H. G. Philpott, of the Dairy Division of the Department. Mr. Philpott executed a draft of the titling and design, which was finished off for the blockmaker by Mr. L. Mitchell, who was also responsible for the drawing of the symbolic wood-cut.

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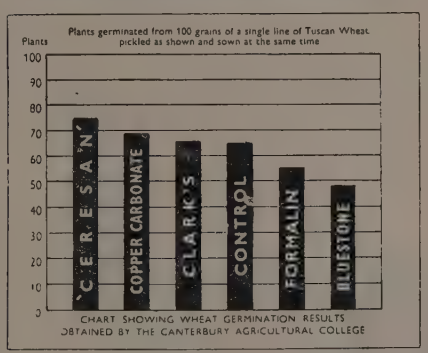

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Health Notes for the Farm.

Contributed by the Department of Health.

The House-fly.

Means of Prevention.

THE prevention and destruction of flies during the summer months is always a problem for the farmer. The country dweller has not the facilities of the townsman for the disposal of his refuse, and, in addition, the excreta of stock provide a breeding-ground for flies and other pests. The old adage that prevention is better than cure holds good in the battle against the fly, but if the invader already has a footing suitable steps must be taken for his destruction in the interests of health and sanitation.

There are several measures that may be taken to prevent the breeding of flies. In the first place, manure-heaps or refuse-pits should not exist near dwellings. Keep all garbage in metal receptacles, and keep covered continuously with tight-fitting lid. Leave nothing lying about which is likely to attract flies. Remember that if nothing more attractive is offering flies will breed in any decaying material. If there is a pan closet, a half-cupful of kerosene should be placed in the pan once a day—flies dislike kerosene. The opening in the seat should be provided with a hinged lid, and the lid kept closed except when the closet is in use.

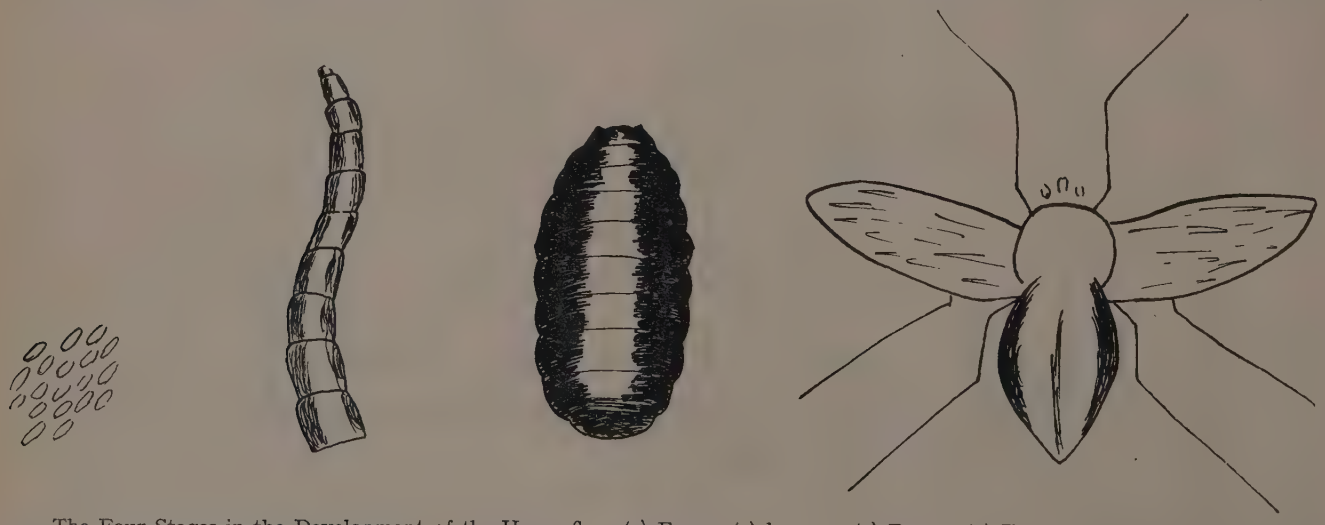
Flies should not be allowed access to the sick room, more especially where an infectious case of disease is being nursed. All discharges from the sick should be immediately destroyed by boiling or by fire, or placed in a disinfectant solution, such as 1 part of carbolic acid, lysol, or formalin to 19 parts of water. These measures are particularly necessary in typhoid fever, dysentry, or diarrhœa. Persons suffering from consumption should not spit about, and their sputum should not be allowed exposure to flies. Never allow a fly to come in contact with any article of food—protect milk especially, also sugar, jam, cakes, &c.

Kerosene is particularly distasteful to flies; a few drops sprinkled in dust-bins after they are emptied are effectual, and a rag damped with paraffin and passed around window-frames will keep flies away.

Destruction of Adult Flies.

Papers coated with tanglefoot are, nowadays, procurable almost everywhere, in the form of narrow strips intended for suspension. It is sometimes advantageous to make a supply of tanglefoot for oneself, since its manufacture is quite easy, and once made it can be kept indefinitely in a closed tin and used as required.

The best ingredients are castor-oil and powdered resin, which are converted into tanglefoot by weighing out 5 parts of the former and 8 parts of the latter, and heating the two together until the resin is entirely dissolved. There is no advantage in allowing the mixture to boil. For use it should be applied as thinly as possible while hot, or after being heated, to the surfaces that it is intended to coat. The latter may include glazed paper (or paper coated with a solution of one ounce of ordinary glue in three ounces of water, applied with a



The Four Stages in the Development of the House-fly: (1) Eggs; (2) larvae; (3) Pupa; (4) Full Grown Fly. The Final Stage is reached within Fourteen Days.

fine brush all over the surface, and allowed to dry before the coating of tanglefoot is given; unglazed absorbent paper is useless); stout iron wires for suspension vertically in kitchens or latrines; horizontal wires stretched across the interiors of dining-huts above head level; and the woodwork of temporary shelters in which flies are numerous.

Vertical wires should be two or three feet in length and should have one end bent over to form a hook; they can then be suspended from a cord stretched across a room or window-opening. Naturally, tanglefoot is effective only so long as it remains "tacky"; tanglefoot-coated surfaces which have become dry or are covered with dust are absolutely useless. Should coated, vertical wires have a tendency to drip, this may be prevented by affixing to the lower end of each a small square of stout paper, crumpled so as to form a rough cup. A wire which is covered with dead flies is readily cleansed by rubbing it vigorously with newspaper or passing it through a fire, and can then be recoated. (Austen—"The House-fly.")

Some of the proprietary sprays and powders on the market are effective in reducing the numbers of adult flies. The room should be closed whilst the preparation is used, and the stupified flies swept up and burned.

Use of Formalin.

In the past formalin has not always been effective, but the use of lime-water in the mixture has increased the efficiency. To kill flies by means of formalin, mix together 2 tablespoonfuls of commercial (40 per cent.) formalin, 1 heaped tablespoonful of sugar, ½ pint of clear lime-water, and water to make up 1 pint. It is advisable to use lime-water in the proportion indicated, since, as was discovered by Dr. Ll. Lloyd, in the Hygiene Department of the Royal Army Medical College, during the Great War, a solution of formalin in water otherwise soon becomes acid, and consequently unattractive to flies.

For use, it is best to place the mixture in a closed vessel, so as to shield it from the action of the air and to ensure that flies do not fall into it, since exposure to the air and pollution by the bodies of flies neutralize the lime-water, and cause the fluid to become acid. The mixture may be poured into a tin, which is then closed by a lid perforated with holes, through which are passed wicks so arranged that their lower ends dip into the fluid.

Perhaps an even simpler mode of employment is that which is described by Dr. Lloyd, as follows: "The poison is placed in a bottle, and the mouth is closed by means of a platform of absorptive material, from the centre of which a stem of the same material passes down into the fluid. The top is wetted with the fluid at the commencement, and is kept wet by capillary attraction. Such an arrangement may easily be made from blotting-paper. A circle of the paper 2 in. in diameter is cut out, and a small slit is made in the centre. Two strips of paper of the same width as the slit are then passed through it, and the ends are doubled outwards and downwards. The strips are then drawn down till the doubled-back portions rest on the platform, and the trap is ready for use. This form of trap may be used under cover or outside when it is not raining. The paper should be renewed every third or fourth day in any case.

Poisonous Mixture.

Indoors formalin generally works best in the early morning when in kitchens, dining-rooms, or offices, provided precautions be taken to ensure that no other sources of refreshment are accessible to house-flies. The insects may often be found dead in large numbers round the vessel used as a container. In warm, dry weather, when there is no wind, formalin mixture can also be employed with good effect in the open air on the edge of manure-heaps, near refuse-bins, or in the vicinity of stables, kitchens, and latrines. Since formalin is poisonous to human beings, the mixture must be used with caution, and care must be taken to prevent it from being interfered with by children.

In camps in which house-flies are abundant, the insects may often be found at night sleeping in large numbers on overhead wires of hanging cords. Under such conditions, they can readily be killed by burning them off by means of a brown-paper torch, or a lump of cotton-wool saturated with methylated spirit.

If a soup-plate or similar shallow vessel containing a small quantity of petrol be passed beneath house-flies resting as described in the foregoing paragraph they are stupefied by the fumes, fall into the liquid, and are killed.

Treatment of Manure.

Needless to say, manure presents the greatest attraction to flies, and is the favourite breeding-place.

Method 1.—Close Packing: For close packing (a method introduced in 1915 by Colonel S. A. Monckton Copeman, M.D., F.R.S., T.D., late Ministry of Health), an area of hard, level ground, at least 3 ft. or 4 ft. greater in extent each way than the ultimate size of the intended dump, must be selected or prepared (the area may either be cemented over, or receive a top-dressing of 1 part by volume of mineral wood-preserving oil mixed with 40 parts of fine soil, the mixture being spread on the ground and beaten down; 1 gallon of oil will suffice for 100 square feet) to receive the manure. On this, each day's manure is utilized in forming or adding to a compact, rectangular block, which may be of any desired dimensions horizontally, but for convenience of treatment should not exceed 5 ft. in height. Each load of manure on being added to the dump must be pressed down firmly with shovels, and if the weather be dry should be sprinkled slightly with water; finally the sides, which should be somewhat sloping, must be beaten and smoothed down with the shovel.

While house-fly maggots are speedily killed at temperatures above 114·8° F., it was found by Colonel Copeman that, 4 in. beneath the surface of a heap of fresh stable manure treated in this way, the heat produced by fermentation may be as much as 169° F. It should be noted that the fertilizing value of close-packed manure is greater than that of loosely stacked manure. The success of close packing as a preventive of house-fly breeding in horse-manure has been proved in England, and, with certain modifications and additions, the method has been found effective in the warmer climate of Bermuda. In the event of failure from some unforeseen cause, the portion of the dump (both sides and top) in which maggots are seen should be covered over with a layer of sacking (old coal sacks, if without holes, answer well) soaked in heavy oil and secured by means of large stones; the sacking need only be allowed to remain for one week, after which, if required, it may be employed on another part of the dump. (Austen—"The House-fly.")

Method II.—Turning over the Surface: The area on which the dump is placed should be similar to that described above under "Close Packing." The dump itself should be kept compact and flat-topped, but need not have its surface beaten down; the slope of the sides should not exceed 30°. Each part of the dump, on the day after deposition and on the two following days, should be turned over in such a manner as to bury the outer layer 5 in. or 6 in. deep, thus exposing the maggots, if present, to the almost instantly fatal effects of the heat and gases of fermentation at deeper levels. The method is somewhat laborious, but, to be effective, must be carried out conscientiously; if necessary, it may be supplemented by the use of oiled sacking, as already detailed. (Austen—"The House-fly.")

Sodium Arsenite.

Method III: Sodium Arsenite — the arsenate is useless. This poisons both larvæ and adult fly: 1 lb. sodium arsenite; 12 lb. treacle; 5 gallons water.

Since sodium arsenite is not readily soluble in cold water, it should be dissolved in a little boiling water and added to the sweet solution.

For use, mix ½ pint of the above mixture with 4 parts water. The best method of application is for the horse-manure to be thoroughly sprayed on the floor of the stable before being gathered up; the manure to be gathered up at least once daily. The surface of the manure in the bin may be sprayed as a final dose. It is not necessary to cover the bin; in fact, it is probably better left open to act as an attraction and fly-trap. Any soiled portions of the stable floor should also be sprayed. It should be remembered that where manure is sprayed in bulk every portion of it should be thoroughly forked over and exposed to the spray. In default of a spray, the liquid may be applied by means of a rose watering-can with no injury to manurial value. The solution is highly poisonous, and is therefore not suitable for use in private houses. As an aid in distinguishing, it may be coloured with a pinch of methylene blue.

This method is the method of choice for use at stables, garbage-tips, and night-soil depots. In addition to spraying, bits of coarse cloth are hung so as to dip into tins of this solution, fresh water being added from time to time to keep the level of the solution in the tins about the same, as flies dislike it when it has been allowed to get too strong owing to the evaporation of the water. The solution can also be sprayed on leafy branches of trees and then distributed and hung about. Places where flies congregate after sundown should be sprayed every evening.

For indoor use in small quantities, 1 gramme (15½ grains) of sodium arsenite is dissolved, by aid of heat, in 3½ in. of water, to which 2 heaped teaspoonfuls of sugar should be added; the attractiveness of the solution to flies will be enhanced if beer be substituted for water. The mixture can either be exposed on pads of cotton-wool in tin trays (in which case a pad, once impregnated, can be made to do duty for a week or more by moistening it as it becomes dry) or placed in closed tins provided with wicks. (Austen—"The House-fly.")

Householders who obtain an occasional load of manure will find spraying (not surface spraying merely) with "Solution D," a proprietary preparation, of use, and then burying. "Solution D" is expensive, however.

Remember.—That fly larvæ will develop in untreated manure buried at least 15 in. Sheep-dips, unless they contain arsenite of soda, are useless. Chloride of lime is useless.

Swimming.

EVERYBODY should know how to swim. As a means of exercise and enjoyment it is almost unequalled; as a factor of safety it may be a matter of life or death. The summer casualty reports are crowded with accounts of those who have lost their lives by drowning. The Coroner's verdict can usually be condensed into five words: "Accidental. He could not swim." A more accurate statement would be: "Carelessness on somebody's part. He was never taught to swim." It should be the aim of every person, therefore, to learn to swim, and, if opportunity occurs, to belong to a life-saving club, and right at the beginning learn to swim properly. Correct breathing and technique of the various strokes adds much to its value as a health-giving exercise and a means of saving life. But, like everything else, swimming is not an unmixed blessing; it can be abused, and is attended with danger. Some cynics say the good swimmers are usually venturesome and most likely to be drowned. Be that as it may, a few words of caution to swimmers may be opportune, now that the swimming season is approaching.

Where the swimming is done is a matter of importance. Strong tides, currents, and surf make dangers in some natural waters with which newcomers should acquaint themselves before venturing far from shore. If in the sea, it may be sometimes a great error to try to get to land. If there be a strong outsetting tide and you are swimming by yourself, then get on your back and float till help comes. Many a man exhausts himself by stemming the billows for the shore on a back-going tide, when if he had floated, a boat or other aid might have been obtained.

Fitness at Fifty.

The age, skill, and state of health of the swimmer should also be taken into account—over-enthusiasm may be the cause of accidents or severe strain. Moderation is the greatest safeguard. No matter what may be said to the contrary, a man of fifty is not what he was when a boy, especially as a swimmer—and his heart should be given a thought before his first plunge.

Diving may be safe for young people, but older folk will be wise if they take it easy. Some people are subject to earache after swimming. They should wear caps, or, better still, keep their heads above water. Cramps, chills, and sunburn, are by-products of swimming that may have serious after-effects, and should be avoided. As a general principle it is well to swim near other people, who may be useful in case of emergency.

Remember.—Swimming is a desirable accomplishment. If possible, learn from an expert at an early age. It is one of the sports that involve all-round exercise. Engaged in moderation it is one of the greatest promoters of general physical fitness. If, for no other reason, you should learn to swim because it is good fun. Do not let this summer go by without convincing yourself of the truth, for your general health and pleasure.

An old pig-paddock of ¼ acre at Hairini, Te Awamutu, was planted in pampas grass at the latter end of October, 1934. The pampas made excellent growth, developing into large bushes, and attaining a height from 10 ft. to 12 ft. No attention was given to stand as regards removing seed, stems, &c. The area was fed off (first feeding) by dairy cows and was particularly well grazed. The stand afforded grazing for 120 cows twenty minutes per day for twenty-two days. The stock were turned in at 8.40 each morning and removed at 9 o'clock. The stock seemed to fill up during that time, and immediately lay down after being removed from the pampas. No further grazing was done by the stock until on or about noon, when they gradually drifted away to the paddocks available to them.

Founders of Modern Agriculture.

J. W. Woodcock, Fields Division.

In a short series of articles it is proposed to say something about some of the men who have helped to make agriculture what it is to-day.

Our conception of modern agriculture is not confined merely to the operation of the farmer's boy—"to plough and to sow and to reap and to mow"—carried out on up-to-date lines, but, rather, the whole organization of agriculture, embracing as it does modern farming methods, agricultural shows, farm statistics, agricultural journalism, refrigeration, rural transport, and a host of others. Who were the founders of modern agriculture? Historians have given them scant attention, and yet, when it is realized the part that agriculture plays in the importance of nations, it seems strange that so little is known of the lives of these pioneers who have developed the fundamental principles and improved practices of modern agriculture.

In any survey of agricultural progress it is difficult to know where to begin, since so many of the things we see about us can be traced back to the ancients. Moreover, modern agriculture owes much to the inquiring minds of the early philosophers such as Francis Bacon, who, in 1626, carried out the first experiment in refrigeration. One can say, however, that modern agriculture would commence at about the year 1700, this being about the time when Jethro Tull first came into prominence. It was at this period that men began to get down to the fundamentals underlying plant nutrition, and the principles enunciated by Tull on that subject were typical of those held by his contemporaries. It is convenient, therefore, to take Jethro Tull as a starting-point in this review of agricultural progress.

Jethro Tull (1674–1741).

Jethro Tull was the founder of the drilling and horse-hoeing system of husbandry.

Impressed by the great value of thorough cultivation and aeration of the soil, Tull preached the doctrine of cultivation, and based all his ideas on three principles—drilling, reduction of seed, and absence of weeds. He invented a drill and a horse-hoe, sowing his crops in rows instead of broadcast, and cultivated between the rows. He was an ardent advocate of the weedless field, and he regarded farmyard manure as a serious menace to clean tillage, as the seeds of troublesome weeds were apt to be scattered far and wide over the farm. But he held a mistaken idea that cultivation alone was sufficient to maintain the fertility of the soil, that the earth was the true and sole food of the plant, and, further, that the plant feeds and grows by taking in particles of soil. He states, "It is agreed that all the following materials contribute in some manner to the increase of plants, but it is disputed which of them is that very increase or food, (1) nitre, (2) water, (3) air, (4) fire, (5) earth. Every plant is earth, and the growth and true increase of a plant is the addition of more earth." The above are quotations from the book, "The New Horse-howing Husbandry," which Tull published in 1733. So much notice was taken of this publication that Cobett tells us that it was "plundered by English writers not a few and by Scotch in whole banditis."

Tull was the first to grow turnips as a field crop in Great Britain, but little notice was taken of his example, and the value of the turnip crop was not realized until Lord Townshend's highly successful cultivation of the crop in Norfolk had attracted widespread attention to it.

Although we know that many of Tull's theories were wrong and that plants do not take in particles of earth, but absorb food in solution, his practices have been followed by all progressive farmers up to this day. Occasionally we are inclined to overlook the principle that the more the particles of soil are broken up the more plant-food the roots can absorb, and efficient cultivation is often neglected or only carried out on the surface.

Crops often receive inadequate row cultivation in spite of the benefits to be gained, and although it is over two centuries since Jethro Tull showed the advantages of the drill the broadcasting of small seeds such as grass is still the general rule, chiefly owing to the fact that satisfactory drills for such crops have not yet been devised.

(To be continued.)

Founders of Modern Agriculture.

"For the finer land is made by tillage the richer it will become and the more plants it will maintain."—Jethro Tull.

A clover inoculation trial was sown down in the Bay of Plenty district last autumn with 22 lb. certified seed per acre, and adjacent to the control block an area was sown at the rate of 65 lb. uncertified seed per acre. The certified area is well established with a good sward of rye-grass and white clover. Where uncertified seed was sown, the pasture is very open, with 50 per cent. weeds.

A recent investigation on the west coast of the South Island showed that where borax was used, either top-dressed on the land or incorporated in the manure, the crops of swedes and turnips were free from mottled heart.

Department of Agriculture

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Answers to Inquiries.

Subterranean Clover on Hill Country.

D. R. (Dannevirke) :—

Could you advise me on the possibilities of getting a strike of subterranean clover on hill country, which was originally bush country, and is now carrying a fair sole of native grass ? I had in mind broadcasting the seed in the autumn.

What would be the amount per acre, the best time to sow, and is there any particular strain of plant suitable ?

Fields Division :—

Subterranean clover can be successfully established by surface sowing on established hill country pasture under the conditions mentioned. From 3 lb. to 6 lb. of seed per acre should be broadcast in late February or early March. It is not necessary or desirable to have the area grazed hard, as some roughage is not detrimental to germination and protects the seed and young plants from birds, especially larks. Top-dressing is considered essential to the successful exploitation of subterranean clover, and the seed should be mixed for distribution with from 1½ cwt. to 3 cwt. per acre of superphosphate, and the area top-dressed again the following year. The initial establishment is one of scattered plants, and the cover of subterranean clover in the second and subsequent years is increased many times by the top-dressing. Mt. Barker is a satisfactory type under your conditions, although a type known as Tallarook, which is somewhat later in making its main growth, is also proving valuable in maintaining production later into the summer. A mixture of these two types, both of which are now available, can be recommended.

F. H. E. (Geraldine) :—

Last February I sowed 1 bushel ryegrass, 7 lb. cocksfoot, 1 lb. white clover, and 2 lb. subterranean clover on light soil. Result, a good all round strike. Have grazed sheep until now. Should I shut up paddock completely, or stock lightly for, say, two or three months ? Would like information *re* subterranean clover going to seed.

Fields Division :—

Subterranean clover being an annual, it is necessary to allow the plant to reseed if you wish to keep the plant in the pasture. I would suggest that you take the stock off the area during the flowering period and leave them off until the seeds have formed and ripened. When this has taken place the area can be restocked.

Subterranean clover responds very readily to superphosphate, therefore an application of 1½ cwt. to 2 cwt. per acre of superphosphate in January will aid the young seedlings in their establishment.

Fermentation of Vegetable Matter.

T. H. (Kotemaori) :—

Would you please give me any information you may have on the method of fermenting vegetable matter as described by Rudolph Steiner or Sir Albert Howard.

Horticultural Division :—

The method worked out by Sir Albert Howard, late Director of the Institute of Plant Industry, Indore, Central India, is known as the Indore process. It is based on the rapid transformation of a mixture of vegetable wastes by means of fungi and bacteria. To enable them to do this they must be supplied with the necessary food materials, and also with suitable working-conditions. These are combined nitrogen (preferably in the form of manure and urine), phosphates, and potash ; a base (soil, wood ashes, or lime) to reduce the excessive acidity ; sufficient water ; and abundance of air. Under suitable conditions the waste materials are then rapidly attacked by fungi, after which the later stages of humus manufacture are carried on by bacteria. There is no smell ; flies do not breed in the mixture ; the seeds of weeds, the eggs of noxious insects, and spores of harmful fungi are all destroyed by the intense fermentation and by the high temperature and humidity which obtain. The result is a humid powdery material which is a useful organic manure. Under the conditions at Indore this is done in one or two months. The process is of great importance where intensive cropping is done.

The subject is fully dealt with in a book, "The Waste Products of Agriculture," by A. Howard and Y. D. Wad, Oxford University Press. Also Bulletin No. 1, 1934, Institute of Plant Industry, Indore.

Top-dressing.

J. B. (Taumarere) :—

I would very much like your advice on the following subjects :—

1. I have always been an advocate for superphosphate and lime for pastures, and argue that 1 ton super, 1 ton lime, is equal to 2 tons basic slag.

2. I think I remember some years ago reading in the *Journal* that in the new process of the manufacture of steel that the basic slag of to-day is fortified with rock phosphate. Is that so ?

3. I top-dress three times a year about 3 cwt. super and 4 cwt. lime, with 1½ cwt. 30 per cent. potash. I never allow the pasture to get tufty, but use the mower frequently. From one paddock I take two good crops of hay. Now, buttercups came in last year, and this season I have a beautiful golden mass in the hay-paddock. The land is good river-flat.

4. Can I have a soil analysis taken by Department ?

Fields Division :—

1. The value of super plus lime compared with basic slag alone depends on the class of land. On soils that require lime, slag alone is generally more efficient than superphosphate alone, but when the soil deficiencies in lime are made up superphosphate and basic slag are about equal.

2. Basic slags of present-day manufacture contain 8 per cent. to 18 per cent. of phosphoric acid. Only the high-grade slags of over 16 per cent. phosphoric acid are imported into New Zealand, and these are not fortified with rock phosphate, as you suggest.

3. Buttercups become prevalent on land that lies wet in the winter. They can be checked to a certain extent by mowing, but the most satisfactory way to eradicate them is by close grazing with sheep.

4. Soil analysis is carried out by the Department at a charge of £5 5s., but it has been found that, while the ordinary analysis discloses what is in the soil, it does not disclose the amount of available plant-food. Fertilizer responses in North Auckland have been obtained by field trials, and are now well enough known to enable advice on the fertilizing necessary for the various soil-types to be given satisfactorily.

Review: "A History of the New Zealand Dairy Industry."

H. I. FORDE, Editor.

THE pioneer in history, like the pioneer in agriculture, has to overcome difficulties and obstacles which do not impede the progress of his successors. He has to explore untapped sources of data, some of which are unexpectedly fruitful, while others are vexingly and depressingly disappointing, investigate for the first time popular misconceptions which masquerade as historical facts, check up on all those whose enthusiasm to help is stronger than their memories, and then from a mass of material set down in an orderly, readable narrative the results of laborious days in virgin fields. Once the history is produced, there is generally a flood of criticism. Every one else who examines the work has different ideas of approach and emphasis, and, with an intolerence sometimes arising from a superficial knowledge, the critics make sacrifice of their latest victim.

The historian's task, if it is well done, is an unenviable one, and we ordinary mortals are fortunate indeed that a few people have sufficient zeal, persistence, and ability to recall for us the story of the past and the lessons that it brings. In New Zealand we have a group of men with those attributes, and with the approach of the Centennial of British sovereignty of the Dominion it is their job to piece together for future generations the story of the activities of Maori and pakeha in a span of one hundred years.

The writing of New Zealand's history is in the process of being planned for the first time, and when the work is completed there is one volume already written which will take its place alongside those already unpenned. It is "A History of the New Zealand Dairy Industry," by H. G. Philpott, a member of the Dairy Division of the Department of Agriculture. Mr. Philpott's history begins with the introduction of the first dairy stock into the Dominion by the Rev. Samuel Marsden in 1814, and ends with the introduction of the system of a guaranteed price—in other words, he has given us a full-sized canvas. Upon that canvas he has painted an engrossing picture. Without the romantic tinges, which are generally much more patent to those whose acquaintance with the industry stops at the farm-gate than to those who have to milk the cows, he has emulated the Dutch school in his regard for detail, and, like the Dutchmen also, has garnished his canvas with personalities.

It is this blend of events and pen pictures of those who brought about those events that makes the book so palatable. Few will agree with Emerson's glib phrase that history is only biography, but, on the other hand, few can steer a judicious course between circumstances and opportunities and those who exploit them. In a country where soil and climate have been stauncher allies than men, it is only right that a balance should be preserved, and Mr. Philpott has acquitted this aspect of his work admirably.

The first section of the history covers the arrival of the first domestic cattle, the early expansion of the industry, the establishment of the dairy-factory system and the commencement of the export trade, the steady expansion of the industry from the "nineties" onwards up to the present era, when the volume of exports threatens to overrun the effective demand. The rise of a number of the now historic factories is outlined, and in an age when collectivism is found both in theory and practice the beginnings of co-operation in the manufacture of dairy products makes fascinating reading. The importation of the experts, who made a timely rescue of the industry from threatened chaos, is a reminder of the debt that we owe to scientific knowledge and the men who can impart it. The marketing difficulties are touched upon—perhaps too lightly for some people—but it has to be remembered that this book is a history of more than a century, and, however important these matters are at present, they are rightly not allowed to dominate the picture. They are, in fact, a separate study for the economist who is bold enough to tackle them.

The second section of the book deals with a number of important topics that have evidently been excluded from the main narrative in the well-founded fear that they would have made it too involved. Whatever was the reason, the decision was a wise one. The plan has the blessing of one reader at least. This section covers the evolution of dairy-farming, the ramifications of the Dairy Division of the Department of Agriculture, the legislation affecting the industry, and organizations such as the Dairy Associations, the Dairy Board, the educational and research institutions, the Co-operative Rennet Company, the Egmont Box Company, marketing companies, the Wellington City milk-supply, the industry in the United Kingdom, Tooley Street, and the Ottawa Agreement. There are five chapters devoted to what one might term the preparation of the raw materials for the market, and one dealing with dairy machinery and appliances. Mr. Philpott has called in the skilled aid of Mr. G. M. Valentine, the Assistant Director of the Dairy Division. Dairy-cow testing is understandingly described, and there is an interesting chapter on Maori dairy-farmers. As an appendix to the volume there is an elaborate and highly informative set of statistics, many of which are published for the first time. This appendix is really a statistician's history, and increases the value of the book considerably.

One cannot overlook, even in this short review, the illustrations. They include photographs of the personalities who have been identified with the industry, early dairy factories, and some famous cows and herds. The illustrations are generous in number, and certainly enhance the printed word.

Mr. Philpott can rest assured that his work will be widely appreciated. He himself will be the first to admit that he has not told the whole story—no single volume could do that—and he must have had many regretful moments when he discarded good material. Perhaps he will be encouraged to enlarge his theme at some future day. If he does not, he will have the satisfaction of knowing that he has made the crooked straight and the rough places plain for others who may follow him back through the years in the dairy industry. He has been the successful pioneer.

["A History of the New Zealand Dairy Industry" is published by the Government Printer. Price, 15s.; postage, 8d.]

New Insect Pest of Maize.

SEVERAL cases of failure in the germination of maize in the Pakowhai District, Hawke's Bay, were investigated by the local Instructor in Agriculture. The cause of the trouble appeared to be a slender black beetle up to ½ in. in length which had eaten into the maize kernels, preventing germination of up to 75 per cent. of the seed. The assistance of the Government Entomologist at the Cawthron Institute was sought in regard to identification of the beetle and possible methods of control. The beetle has been tentatively identified as *Clivina impressifrons*, commonly known in America as the "slender seed-corn beetle." In Australia, where this beetle at times gives trouble, the suggested remedy is to dip the seed before planting in a repellent mixture such as thin tar, then into lime dust with which a little paris green has been mixed.

It is apparent from the number of crops affected and the severity of the attack that this beetle is likely to prove a bad pest of maize-seed beds, and it is hoped to have available more definite information regarding satisfactory control measures before next planting season.

Carcass Quality of Bacon Pigs.

Influence of Restricted Feeding.

RESTRICTED feeding as a means of reducing excess back fat of bacon pigs is receiving attention in many countries and is of special importance in New Zealand, where "full feeding" separated milk and buttermilk at commercial piggeries and farms produces pigs with excessive back fat, which is a source of complaint on the Home market.

A second method employed with success in Denmark is the feeding of roots as a portion of the fattening ration.

Trials are being carried out at the Ruakura Farm of Instruction along these lines, and pigs sold to a commercial piggery and fattened on buttermilk have been examined for carcass quality and compared with those fattened at Ruakura on separated milk, roots, &c.

The carcasses of the various groups were examined for length, back fat, &c., and a summary of the results are given below. It will be seen that restricted feeding and root feeding have given satisfactory results in reducing back fat, more especially at the last rib, and, while pigs fed restricted rations require a little longer to reach bacon weights, they do not require a greater amount of food than those receiving a full fed ration.

The groups on the reduced separated-milk ration were compared with Group 2, restricted by 1 gallon per pig per day until they reached 150 lb. live-weight, and from then until they reached 200 lb. they were restricted by 2 gallons per pig compared with Group 2.

A root-feeding trial was carried out with pigs which had been overwintered on meat-meal, maize, and roots. The pigs were stied on reaching an average of 104 lb., and a ration of meat-meal 1 lb. maize up to 2½ lb., and roots to appetite was fed. The feeding-value of the roots averaged 49·1 per cent. of the total ration for the fattening period, and returned 9s. 2d. per ton after costing meat-meal and maize at ruling rates.

The mean thickness (millimetres) of back fat for the group was as follows :—

	Shoulder.	Last Rib.
Group 5 ..	41·6	26·4

The group was considered by the grader to be an excellent line.

From the results given it will be seen that restricted rationing and root feeding can be the means of reducing the back fat by about ¼ in., while the carcasses were not inferior to the full fed ones in any respect.

Ration.	Thickness of Back Fat (Millimeters).	
	Shoulder.	Last Rib.
Full Fed Groups.		
Group 1 : Buttermilk	48·2	30·4
Group 2 : Separated milk (stied)	43·8	28·6
Group 2 was full fed to a maximum of 6½ gallons per pig.		
Restricted Feeding.		
Group 3 : Separated milk	41·1	23·5
Group 4 : Separated milk	44·7	25·4

Loose Smut in Wheat.

A NUMBER of crops of Jumbuk wheat in the Rangitikei and Manawatu districts were badly infected with loose smut this season. The spores from this smut enter the grain of adjoining heads while the wheat is flowering, and a scattered infection can result in a large proportion of the grain carrying the disease. Next year's crop from such seed may easily show a loss in yield of many bushels per acre. Farmers whose crops have been affected with loose smut are well advised to look round for some clean crops from which to secure fresh seed-supplies. Two crops of Jumbuk entered for certification this year in the Rangitikei are particularly free from this smut, and indications are that some crops in Canterbury will also provide relatively clean seed. The spores of loose smut are actually in the grain and are not carried on the outside coat, as it the case with the rusts and stinking smut. For the latter, pickling in copper carbonate or dry dusting with Agrosan or Ceresan is effective in control, but with loose smut the only satisfactory method is that known as the "hot-water treatment." This treatment can be carried out only where special facilities are provided, and the usual practice is for a small quantity of seed to be treated, from which is grown sufficient seed for fresh commercial stocks. The treatment has to be repeated when the commercial seed has become reinfected to the point of definite loss of yield.

Apion ulicis liberated some years ago for the control of gorse at Alexandra can now be observed on the flowering parts of the plant. On the area that the *Apion* has been working it is impossible to find mature seed. Although the area covered by the insects is not very extensive, they certainly are making a job of that area.

Striking of Seedless Barberry Cuttings.—The cuttings are made from well-ripened growth of the previous season cut into lengths about 8 in. just above and below the terminal buds ; plant them firmly in a light moist soil in nursery rows at a depth which leaves only two buds exposed. They should be ready for planting out next winter. The cuttings are best made during the winter period, early rather than late.

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